JAPANESE [JP,2000-069046,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE INVENTION TECHNICAL PROBLEM MEANS DESCRIPTION OF DRAWINGS DRAWINGS

[Translation done.]

* NOTICES *

CLAIMS

[Claim(s)]
[Claim 1] In the wireless packet communication system which consists of two or more base transceiver stations and one or more wireless terminals among said two or more base transceiver stations The packet B which forms the channel of the shape of a tree on the basis of one specific base transceiver station of them (root station), and is transmitted and received between said base transceiver stations through the channel of the shape of said tree The transmitting agency address which contains the MAC Address of a transmitting agency wireless terminal in a header unit, The destination address containing the MAC Address of a destination wireless terminal, the sending-station address containing the MAC Address of a source base transceiver station which transmits the packet concerned, It has the receiving station address containing the MAC Address of a destination base transceiver station which receives the packet concerned. Said two or more base transceiver stations The imputed table which registers the wireless terminal which belongs to a local station, respectively, and the junction base transceiver station table which registers the base transceiver station in which junction is possible based on the channel of the shape of said tree, It has the address table which matches and registers a destination wireless terminal (destination address) and a destination base transceiver station (receiving station address). Said each base transceiver station When said packet B is received, the source base transceiver station shown in the transmitting agency wireless terminal shown in the transmitting agency address and the sending-station address is matched. If a destination wireless terminal (destination address) and a destination base transceiver station (receiving station address) are likened, it registers with said address table and the destination wireless terminal shown with a destination address is registered into said imputed table The destination wireless terminal which transmits a packet to the destination wireless terminal, and is shown with a destination address on said imputed table by un-registering If it registers with said address table, the destination wireless terminal which transmits said packet B to the destination base transceiver station corresponding to the destination wireless terminal, and is shown with a destination address to said imputed table and said address table and by un-registering And if the base transceiver station in which junction is possible in addition to the source base transceiver station which transmitted said packet B is registered into said junction base transceiver station table The destination wireless terminal which carries out sequential transmission of said packet B to all the base transceiver stations in which the junction is possible, and is shown with a destination address to said imputed table and said address table by un-registering The study mold wireless packet transfer approach which will be characterized by discarding said packet B if the base transceiver station in which junction is possible in addition to the source base transceiver station which furthermore transmitted said packet B has not been registered into said junction base transceiver station table.
[Claim 2] In the study mold wireless packet transfer approach according to claim 1 each base transceiver station When Packet B is received, in case the source base transceiver station shown in the transmitting agency wireless terminal shown in the transmitting agency address and the sending-station address is matched and it registers with an address table When the transmitting agency wireless terminal which starts the registration hold timer corresponding to a

transmitting agency wireless terminal, and is shown in the transmitting agency address is already registered into the address table While resetting said registration hold timer, match the source base transceiver station shown in the transmitting agency wireless terminal shown in the transmitting agency address, and the sending-station address, and an address table is updated. When the registration hold timer which corresponds again is started and said registration hold timer carries out a time-out The study mold wireless packet transfer approach characterized by deleting a corresponding transmitting agency wireless terminal (destination wireless terminal) and the data of a source base transceiver station (destination base transceiver station) from said address table.

[Claim 3] In the study mold wireless packet transfer approach according to claim 1 a wireless terminal When changing into the attribution of a base transceiver station (moved material base transceiver station) to another base transceiver station (migration place base transceiver station) which is carrying out current attribution, a migration place base transceiver station is received. Each base transceiver station on the channel from said migration place base transceiver station to [transmits the hand off packet which made the moved material base transceiver station the destination, and made the local station the transmitting agency, and] a said migration former base transceiver station It is the study mold wireless packet transfer approach which carries out the sequential transfer of said hand off packet, matches the transmitting former address and the sending-station address, registers or updates to an address table, and is characterized by a said migration former base transceiver station deleting said transmitting agency wireless terminal from an imputed table further.

[Claim 4] In the study mold wireless packet transfer approach according to claim 1, in two or more base transceiver stations which constitute wireless packet communication system, and one or more wireless terminals It has the base transceiver station and the wireless terminal corresponding to a cable equipped with the cable interface for connecting with a cable packet network corresponding to a cable. Said base transceiver station corresponding to a cable It is a specific base transceiver station used as the origin of the channel of the shape of a tree which connects with said cable packet network and is connected with other base transceiver stations. When a connection substitute is carried out to cable connection from the wireless connection with the base transceiver station (moved material base transceiver station) as for which said wireless terminal corresponding to a cable is carrying out current attribution, said wireless terminal corresponding to a cable The hand off packet which made the moved material base transceiver station the destination to said cable packet network, and made the local station the transmitting agency is transmitted. Said cable packet network Each base transceiver station on the channel from said base transceiver station corresponding to a cable to [transmits said hand off packet which received to said base transceiver station corresponding to a cable, and] a said migration former base transceiver station Carry out the sequential transfer of said hand off packet, match the transmitting former address and the sending-station address, and it registers or updates to an address table. A said migration former base transceiver station performs processing which deletes a transmitting agency wireless terminal from an imputed table further. When said wireless terminal corresponding to a cable carries out a connection substitute to the wireless connection with a base transceiver station (migration place base transceiver station) from cable connection, said wireless terminal corresponding to a cable Each base transceiver station on the channel from said migration place base transceiver station to [transmits the wireless connection packet which made the local station the transmitting agency to a migration place base transceiver station, and] said base transceiver station corresponding to a cable The sequential transfer of said wireless connection packet is carried out, and the transmitting former address and the sending-station address are matched, and it registers or updates to an address table. Said base transceiver station corresponding to a cable The study mold wireless packet transfer approach characterized by performing processing which carries out broadcasting transmission of said wireless connection packet from a cable interface to said cable packet network.

[Claim 5] When a base transceiver station changes a channel with a high order base transceiver station (changing agency base transceiver station) to another base transceiver station (change

place base transceiver station) and it belongs to a change place base transceiver station in the study mold wireless packet transfer approach according to claim 1 Said base transceiver station and said change place base transceiver station update a junction base transceiver station table mutually. Said base transceiver station deletes registration of a said change former base transceiver station from an address table. Said base transceiver station All the wireless terminals matched with base transceiver stations other than said changing agency base transceiver station out of the wireless terminal under registration to an address table, As opposed to all the wireless terminals and all the base transceiver stations which extracted all the base transceiver stations of the low order under registration on all the wireless terminals under registration on an imputed table, and a junction base transceiver station table, and were extracted further All the wireless terminals and all the base transceiver stations which carried out sequential transmission of the hand off directions packet it is directed that transmits a hand off packet to a changing agency base transceiver station, and received said hand off directions packet, Each base transceiver station on the channel which transmits the hand off packet which said base transceiver station made the destination the said change former base transceiver station, and made the local station the transmitting agency, respectively, and reaches a said change former base transceiver station Carry out the sequential transfer of said hand off packet, match the transmitting former address and the sending-station address, and it registers or updates to an address table. Furthermore, a said change former base transceiver station is the study mold wireless packet transfer approach characterized by deleting said base transceiver station from said junction base transceiver station table.

[Claim 6] When a base transceiver station changes a channel with a high order base transceiver station (changing agency base transceiver station) to another base transceiver station (change place base transceiver station) and it belongs to a change place base transceiver station in the study mold wireless packet transfer approach according to claim 1 Said base transceiver station and said change place base transceiver station update a junction base transceiver station table mutually. Said base transceiver station deletes registration of a said change former base transceiver station from an address table. Said base transceiver station All the wireless terminals matched with base transceiver stations other than said changing agency base transceiver station out of the wireless terminal under registration to an address table, All the base transceiver stations of the low order under registration on all the wireless terminals under registration on an imputed table and a junction base transceiver station table are extracted. It considers as transmitting [all the wireless terminals furthermore extracted, all base transceiver stations, and a local station] origin. Each base transceiver station on the channel which transmits the hand off packet which made the destination the said change former base transceiver station, respectively, and reaches a said change former base transceiver station It is the study mold wireless packet transfer approach which carries out the sequential transfer of said hand off packet, matches the transmitting former address and the sending-station address, registers or updates to an address table, and is characterized by a changing agency base transceiver station deleting said base transceiver station from said junction base transceiver station table further.

[Claim 7] The base transceiver station which received the packet B which made the base transceiver station the transmitting agency in the study mold wireless packet transfer approach according to claim 1 The source base transceiver station shown in the transmitting agency base transceiver station shown in the transmitting agency address and the sending-station address is matched. Liken a destination base transceiver station (destination address) and a destination base transceiver station (receiving station address), and it registers with an address table. The base transceiver station on the channel which transmits the hand off packet which makes the destination each base transceiver station according to claim 3 to 6, a hand off directions packet, and a wireless connection packet The study mold wireless packet transfer approach characterized by transmitting said each packet to the destination base transceiver station corresponding to the destination base transceiver station based on said address table.

[Claim 8] It consists of two or more base transceiver stations and one or more wireless terminals. Among two or more base transceiver stations In the base transceiver station of the

wireless packet communication system in which the channel of the shape of a tree on the basis of one specific base transceiver station of them (root station) was formed The imputed table which registers the wireless terminal which belongs to a local station, and the junction base transceiver station table which registers the base transceiver station in which junction is possible based on the channel of the shape of said tree, It has the address table which matches and registers the transmitting agency address and the sending-station address of a receive packet. In the case of the packet B distinguishes the classification when a packet is received, and a receive packet transmits and receives between said base transceiver stations through the channel of the shape of said tree The base transceiver station using the study mold wireless packet transfer approach characterized by having the control means which determines the destination base transceiver station of a packet based on the study mold wireless packet transfer approach according to claim 1, and performs the registration and updating of each table.

[Claim 9] It consists of two or more base transceiver stations and one or more wireless terminals. Among two or more base transceiver stations In the base transceiver station of the wireless packet communication system in which the channel of the shape of a tree on the basis of one specific base transceiver station of them (root station) was formed The imputed table which registers the wireless terminal which belongs to a local station, and the junction base transceiver station table which registers the base transceiver station in which junction is possible based on the channel of the shape of said tree, The address table which matches and registers the transmitting agency address and the sending-station address of a receive packet, It has the registration hold timer which measures the continuation sheep time of delivery of the packet which has the transmitting agency address of registration to an address table. In the case of the packet B distinguishes the classification when a packet is received, and a receive packet transmits and receives between said base transceiver stations through the channel of the shape of said tree The base transceiver station using the study mold wireless packet transfer approach characterized by having the control means which manages the packet of the same transmitting former address based on the study mold wireless packet transfer approach according to claim 2, and updates the information on an address table.

[Claim 10] It consists of two or more base transceiver stations and one or more wireless terminals. Among two or more base transceiver stations In the base transceiver station of the wireless packet communication system in which the channel of the shape of a tree on the basis of one specific base transceiver station of them (root station) was formed The imputed table which registers the wireless terminal which belongs to a local station, and the junction base transceiver station table which registers the base transceiver station in which junction is possible based on the channel of the shape of said tree, It has the address table which matches and registers the transmitting agency address and the sending-station address of a receive packet. When changing into the attribution of a base transceiver station (moved material base transceiver station) to another base transceiver station (migration place base transceiver station) in which the wireless terminal is carrying out current attribution The base transceiver station using the study mold wireless packet transfer approach characterized by having the control means which transmits and receives a hand off packet based on the study mold wireless packet transfer approach according to claim 3, and updates the information on each table.

[Claim 11] Consist of two or more base transceiver stations and one or more wireless terminals, and it has the base transceiver station and the wireless terminal corresponding to a cable equipped with the cable interface for connecting with a cable packet network into it further corresponding to a cable. In the base transceiver station of the wireless packet communication system in which the channel of the shape of a tree on the basis of the base transceiver station corresponding to the cable connected to a cable packet network was formed The imputed table which registers the wireless terminal which belongs to a local station, and the junction base transceiver station table which registers the base transceiver station in which junction is possible based on the channel of the shape of said tree, It has the address table which matches and registers the transmitting agency address and the sending-station address of a receive packet. When a connection substitute is carried out to cable connection from the wireless

connection with the base transceiver station (moved material base transceiver station) as for which said wireless terminal corresponding to a cable is carrying out current attribution, Or when said wireless terminal corresponding to a cable carries out a connection substitute to the wireless connection with a base transceiver station (migration place base transceiver station) from cable connection The base transceiver station using the study mold wireless packet transfer approach characterized by having the control means which transmits and receives a hand off packet or a wireless connection packet based on the study mold wireless packet transfer approach according to claim 4, and updates the information on each table.
[Claim 12] It consists of two or more base transceiver stations and one or more wireless terminals. Among two or more base transceiver stations In the base transceiver station of the wireless packet communication system in which the channel of the shape of a tree on the basis of one specific base transceiver station of them (root station) was formed The imputed table which registers the wireless terminal which belongs to a local station, and the junction base transceiver station table which registers the base transceiver station in which junction is possible based on the channel of the shape of said tree, It has the address table which matches and registers the transmitting agency address and the sending-station address of a receive packet. When said base transceiver station changes a channel with a high order base transceiver station (changing agency base transceiver station) to another base transceiver station (change place base transceiver station) and it belongs to a change place base transceiver station The base transceiver station using the study mold wireless packet transfer approach characterized by having the control means which transmits and receives a hand off directions packet and a hand off packet based on the study mold wireless packet transfer approach according to claim 5, and updates the information on each table.
[Claim 13] It consists of two or more base transceiver stations and one or more wireless terminals. Among two or more base transceiver stations In the wireless packet communication system in which the channel of the shape of a tree on the basis of one specific base transceiver station of them (root station) was formed The imputed table which registers the wireless terminal which belongs to a local station, and the junction base transceiver station table which registers the base transceiver station in which junction is possible based on the channel of the shape of said tree, It has the address table which matches and registers the transmitting agency address and the sending-station address of a receive packet. When said base transceiver station changes a channel with a high order base transceiver station (changing agency base transceiver station) to another base transceiver station (change place base transceiver station) and it belongs to a change place base transceiver station The base transceiver station using the study mold wireless packet transfer approach characterized by having the control means which transmits and receives a hand off packet based on the study mold wireless packet transfer approach according to claim 6, and updates the information on each table.

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* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the packet transfer approach of a wireless packet network. Especially, it is (1). The wireless packet transfer between base transceiver stations, and (2) When the wireless terminal corresponding to a cable moves in a base transceiver station, it is related with the study mold wireless packet transfer approach used for a packet transfer path change when the wireless packet path change when changing cable connection and wireless connection and (3) base transceiver stations change a high order base transceiver station. Furthermore, it is related with the configuration of the base transceiver station using this approach.
[0002]
[Description of the Prior Art] In the network of a cable, there are a packet transfer approach by the learning bridge (transparent bridge), the packet transfer approach by the source routing bridge, etc.
[0003] Drawing 41 shows the network example which used the learning bridge (conventional technique 1). A learning bridge has interface **1, **2, and **3, and terminals PC1, PC2, and PC3 are connected to each interface, respectively. If a learning bridge receives a packet, the interface which received the MAC Address and packet of a transmitting agency terminal will be matched, and it will memorize on a study table. Here, PC 1 and**1, PC 2 and**2, and PC 3 and**3 are matched.
[0004] When the interface which a destination terminal is registered into a study table, and is matched is not an interface which received the packet, a packet is transmitted from the interface matched with the destination terminal. In the case of the interface with which the interface which a destination terminal is registered into a study table, and is matched received the packet, a packet is discarded. When the destination terminal is not registered into a study table, a packet is transmitted from all interfaces other than the interface which received the packet.
[0005] Drawing 42 shows the network example which used the source routing bridge (conventional technique 2). The source routing bridge B1 and B-2 have interface **1 and **2, respectively, and interface **1 of interface **2 and source routing bridge B-2 of the source routing bridge B1 is connected. Moreover, terminals PC1 and PC2 are connected to each interface of the source routing bridge B1, respectively, and terminals PC1 and PC3 are connected to each interface of source routing bridge B-2, respectively.
[0006] If a packet is received, based on the routing information directed to the header unit of a packet, the source routing bridge B1 and B-2 will choose the next destination source routing bridge, and will transmit a packet. A transmit terminal broadcasts the retrieval frame which contains the MAC Address of a destination terminal first, when transmitting a data packet. The destination terminal which received this retrieval frame broadcasts all the path planning frames that gave the MAC Address of that transmit terminal. The source routing bridge which received all these path planning frames writes in the identifier of a local station, and transmits it to other source routing bridges.

[0007] Out of two or more received path planning frames of all, a transmit terminal chooses all path planning frames with few identifiers of the source routing bridge written in, for example, and memorizes them on a path information table. For example, drawing 42 (b) As path information on a terminal PC 3, "B1, **2, B-2, **2" are registered into the path information table of a terminal PC 1, and "B1, **2" are registered into it as path information on a terminal PC 2 so that it may be shown. A transmit terminal is drawing 42 (c) as routing information to the header unit of a data packet. The permutation of the identifier of the source routing bridge written in all the selected path planning frames is copied, and it transmits so that it may be shown.
[0008]
[Problem(s) to be Solved by the Invention] Each calls drawing 41 and the conventional techniques 1 and 2 shown in 42 at the network of a cable, and if this is applied to a packet transfer of the wireless packet network which consists of a base transceiver station and a wireless terminal, the following problems will produce them.
[0009] With the conventional technique 1 shown in drawing 41 , a learning bridge has two or more interfaces, matches the interface which received the transmit terminal and the packet concerned at the time of packet reception, and registers it into a study table. In order for a base transceiver station to have the same function as a learning bridge, it is necessary to have two or more interfaces first. However, the antenna and strange demodulator circuit which constitute the interface of a base transceiver station are complicated compared with the interface of a learning bridge, and have the problem to which the equipment scale of a base transceiver station becomes large. Moreover, since power consumption also increases suddenly two or more antennas and strange demodulator circuits, available time will be restricted when a base transceiver station is a cell drive.
[0010] If the conventional technique 2 shown in drawing 42 is applied to a wireless packet network, all the wireless terminals that transmit a packet need to carry out broadcasting transmission of the retrieval frame, in order to acquire routing information, and a destination wireless terminal needs to carry out broadcasting transmission of all the path planning frames. That is, whenever the first packet transmission and a transmitting agency wireless terminal change, two broadcasting transmission, a retrieval frame and all path planning frames, is needed. However, generally compared with a cable network, there is a problem to which the effect of the throughput fall by two broadcasting transmission, a retrieval frame and all path planning frames, becomes large in a wireless network with little transmission capacity.
[0011] This invention aims at offering the base transceiver station using the study mold wireless packet transfer approach and this approach of enabling a packet transfer, without being accompanied by the equipment scale of a base transceiver station, and the increment in power consumption in the wireless packet communication system which consists of a base transceiver station and a wireless terminal.
[0012] Moreover, in the wireless packet communication system which consists of a base transceiver station and a wireless terminal, in case this invention judges the suitable base transceiver station which a base transceiver station transmits to a degree, it aims at offering the base transceiver station using the study mold wireless packet transfer approach and this approach of making unnecessary broadcasting transmission of a retrieval frame or all path planning frames, and enabling a deployment of a radio frequency resource.
[0013]
[Means for Solving the Problem] The base transceiver station using the study mold wireless packet transfer approach and this approach of claim 1 uses that the packet B to which between base transceiver stations is transmitted has the transmitting agency address and the sending-station address. Namely, the base transceiver station which received Packet B matches the transmitting agency wireless terminal / base transceiver station shown in the transmitting agency address, and the source base transceiver station shown in the sending-station address, and registers it into an address table. Moreover, the packet B which searches the transmitting agency address (a transmitting agency wireless terminal / base transceiver station) of registration to an address table about the destination wireless terminal / base transceiver station shown with the destination address of Packet B, and makes the corresponding sending-

station address (source base transceiver station) the receiving station address (destination base transceiver station) is generated. Thereby, the destination base transceiver station corresponding to a destination wireless terminal / base transceiver station can be known, and transfer processing can be performed promptly.
[0014] In addition, in a destination wireless terminal not being registered into the address table of all base transceiver stations, although the first transmitting packet is transmitted to all base transceiver stations, the registered packet addressed to a wireless terminal is not concerned with a transmitting agency wireless terminal, but the destination is determined based on an address table. Moreover, renewal of an address table is also performed each time. Therefore, whenever the first packet transmission and a transmitting agency wireless terminal change, a throughput can be raised compared with the conventional technique which needs two broadcasting transmission, a retrieval frame and all path planning frames.
[0015] When a wireless terminal moves to the cel of other base transceiver stations and the wireless terminal corresponding to a cable changes from wireless connection to cable connection, each wireless terminal transmits the hand off packet made into transmitting [a local station] origin to addressing to a moved material base transceiver station which belonged at the beginning (claims 3 and 4). Moreover, when the wireless terminal corresponding to a cable changes from cable connection to wireless connection, the wireless connection packet made into transmitting [a station local station] origin is transmitted, each base transceiver station transmits a wireless connection packet to the base transceiver station corresponding to a cable, and the base transceiver station corresponding to a cable carries out BURODE cast transmission in a cable network (claim 4). By transfer of this hand off packet or a wireless connection packet, the information on the address table of each base transceiver station is updated, and even if each status change occurs, the transfer path of a packet can be promptly determined based on an address table.
[0016] When a base transceiver station changes a channel with a high order base transceiver station (changing agency base transceiver station) to another base transceiver station (change place base transceiver station) and it belongs to a change place base transceiver station All the wireless terminals matched with base transceiver stations other than a changing agency base transceiver station out of the wireless terminal under registration to the address table of a local station, All the base transceiver stations of the low order under registration on all the wireless terminals under registration on an imputed table and a junction base transceiver station table are extracted, and it directs to transmit a hand off packet to a changing agency base transceiver station to all the wireless terminals and all base transceiver stations (claim 5). Moreover, instead of all the wireless terminals and all the base transceiver stations which were extracted by the above, the base transceiver station which makes an imputed change is made into transmitting [them] origin, and carries out substitute transmission of the hand off packet at a changing agency base transceiver station (claim 6).
[0017] By transmitting such a hand off packet to a changing agency base transceiver station, the information on the address table of each base transceiver station is updated, and even if each status change occurs, the transfer path of a packet can be promptly determined based on an address table.
[0018]
[Embodiment of the Invention] (Basic operation gestalt) Drawing 1 shows the example of a configuration of the wireless packet network with which the study mold wireless packet transfer approach of claims 1 and 2 is applied.
[0019] In drawing, AP shows a base transceiver station and STA shows a wireless terminal. Base transceiver stations AP1-AP5 transmit periodically the beacon signal which gave the local station MAC Address, respectively, and the range which the signal reaches is called cel (a broken line shows). The wireless terminal STA will transmit an STA imputed signal to the transmitting origin AP, if a beacon signal is received. AP which received the STA imputed signal judges that the transmitting origin STA exists in a local station cel, and is registered into an imputed table. In the example of drawing 1 , STA1 belongs to AP1 and STA5 belongs to AP5. AP may notify the completion of imputed to STA for the improvement in dependability. It is drawing

3 (a) about the imputed table which registered STA to which each AP exists in a local station cel here. It is shown.
[0020] Moreover, it sets up so that a loop formation may not generate the junction way between AP beforehand. The above-mentioned beacon signal is used for a setup of this junction way. A wireless packet network-control person chooses one specification AP used as the root (root). In the example of drawing 1 , it is AP1. First, AP1 transmits a beacon signal periodically. AP which received the beacon signal transmits AP imputed signal to the transmitting agency AP 1. In the example of drawing 1 , AP2, AP3, and AP4 receive the beacon signal of AP1, and they transmit AP imputed signal to AP1. AP1 which received AP imputed signal judges AP2-AP4 to be AP in which junction is possible, and registers them into a junction AP table. Moreover, AP2-AP4 are registered into a junction AP table by making AP1 into a high order AP. AP1 may notify the completion of imputed to AP2-AP4 for the improvement in dependability.
[0021] Then, AP2-AP4 start transmission of a beacon signal respectively similarly. At this time, a high order AP disregards the beacon signal from low order AP. Moreover, AP which has registered the common high order AP disregards a mutual beacon signal. In the example of drawing 1 , AP5 receives the beacon signal from the both sides of AP2 and AP4. AP5 chooses one from the transmitting origin AP of a beacon signal, and transmits AP imputed signal. Or the received field strength of a beacon signal chooses the greatest AP as the selection approach, the receiving error rate of a beacon signal chooses the minimum AP, or the field which shows the traffic volume of AP is prepared in a beacon signal, and there is the approach of the traffic volume choosing the minimum AP. In the example of drawing 1 , AP5 chooses AP2 and transmits AP imputed signal. In addition to AP1, AP2 which received AP imputed signal registers AP5 into a junction AP table. Moreover, AP5 is registered into a junction AP table by making AP2 into a high order AP.
[0022] By the above procedure, a tree structure as shown in drawing 2 is formed as a channel between each AP of the wireless packet network of drawing 1 . It is drawing 3 (b) about the junction AP table on which each AP registered AP of a junction place (destination) based on the tree structure of drawing 2 . It is shown.
[0023] Drawing 4 shows an example of a packet format used by the study mold wireless packet transfer approach of this invention. Packet A is used for the transfer packet from STA to AP, and has the field of the transmitting agency address, a destination address, and the receiving station address in a header unit at least. Packet B is used for the transfer packet between AP, and has the field of the transmitting agency address, a destination address, the sending-station address, and the receiving station address in a header unit at least. Packet C is used for the transfer packet from AP to STA, and has the field of the transmitting agency address and a destination address in a header unit at least.
[0024] Here, the MAC Address of the source AP to which, as for the transmitting agency address, the MAC Address of the destination STA of a packet and the sending-station address transmit the MAC Address of the transmitting agency STA of a packet, and a destination address transmits the packet concerned, and the receiving station address show the MAC Address of Destination AP which receives the packet concerned. Moreover, data division are distinguished by the identifier which shows a data packet, a hand off packet (H), a wireless connection packet (C), and a hand off directions packet (R), respectively. in addition, the hand off directions packet to which the wireless connection packet to which the hand off packet to which between AP is transmitted, for example is transmitted from BH and STA in explanation of each operation gestalt mentioned later to AP is transmitted from AC and AP to STA -- CR etc. -- it expresses.
[0025] Drawing 5 shows the flow of operation at the time of packet reception of the base transceiver station AP in the study mold wireless packet transfer approach of claim 1. AP receives either the packet A shown in drawing 4 , or the packet B, and transmits either Packet B or the packet C. If AP receives a wireless packet (S1), it judges whether the receiving station address is in agreement with a local station MAC Address (S2), and if it is not a thing addressed to a local station, a receive packet will be discarded (S3) and the thing addressed to a local station will identify the classification (Packet A and Packet B) of a receive packet (S4). In the

case of Packet B, the transmitting agency address (the transmitting agency STA) and the sending-station address (source AP) are matched, and it registers with an address table (S5). In addition, in order to find AP to relay, in case an address table is referred to, it is transposed to the correspondence relation between Destination STA and Destination AP.
[0026] Next, it judges whether the transmitting origin STA shown in the transmitting agency address of Packet B is registered into the imputed table (S6), and if registered, the STA concerned will regard it as what moved to other AP subordinates and transmitted the packet from there, and will delete from an imputed table (S7).
[0027] When processing of the above [a receive packet] in the case of Packet A or Packet B is finished, it judges whether the destination STA shown with a destination address is registered into the imputed table (S8). When Destination STA is registered, Packet C is transmitted to the destination STA (S9).
[0028] In Destination STA not being registered into an imputed table, in order to find AP relayed to a degree, it judges whether Destination STA is registered into the address table (S10). When registered, the packet B which makes the destination AP corresponding to Destination STA the receiving station address based on an address table is transmitted (S11). If it judges whether there is AP in which junction is possible with reference to a junction AP table in addition to the source AP of the packet concerned in Destination STA not being registered into an address table (S12) and there is AP in which junction is possible in it, Packet B will be transmitted to all the AP (S13). Moreover, if there is no AP in which junction is possible, the receive packet will be discarded (S14).
[0029] Drawing 6 shows the example which transmits a wireless packet to STA5 from STA1. Here, STA1 and STA5 presuppose un-registering at the address table of each AP. Moreover, the imputed table and junction AP table of each AP are drawing 3 (a) and (b). It considers as a condition. Hereafter, it explains concretely, making the flow chart of drawing 5 correspond.
[0030] First, STA1 transmits a packet A-1 to AP1. The address field of this packet A-1 is AP1/STA5/STA1//.
[0031] Since AP1 which received this packet A-1 has not registered into an imputed table and an address table STA5 shown with a destination address, it transmits a packet B-1 to AP2, AP3, and AP4 in which junction is possible with reference to a junction AP table (S1, S2, S4, S8, S10, S12, S13). The address field of this packet B-1 is AP2/AP1/STA5/STA1/AP3/AP1/STA5/STA1/AP4/AP1/STA5/STA1/.
[0032] AP3 and AP4 which received this packet B-1 match the source AP 1 shown in the transmitting agency STA 1 and the sending-station address which are shown in the transmitting agency address, and they register it into an address table (S5). Next, since STA5 shown with a destination address is not registered into an imputed table and an address table and AP in which junction is possible does not exist other than AP1, a receive packet B-1 is discarded (S6, S8, S10, S12, S14).
[0033] Similarly, AP2 which received the packet B-1 matches the source AP 1 the transmitting agency STA 1, and registers it into an address table (S5). Next, since STA5 shown with a destination address has not been registered into an imputed table and an address table, a packet B-2 is transmitted to AP5 in which junction is possible in addition to AP1 (S6, S8, S10, S12, S13). The address field of this packet B-2 is AP5/AP2/STA5/STA1/.
[0034] AP5 which received this packet B-2 matches the source AP 2 the transmitting agency STA 1, and registers it into an address table (S5). Next, since STA5 shown with a destination address is registered on an imputed table, a packet C-1 is transmitted to STA5 (8 S6, 9). The address field of this packet C-1 is STA5/STA1///. The condition of the address table of each AP after the packet transfer to STA5 shown above from STA1 is shown in drawing 7 .
[0035] Drawing 8 shows the example which transmits a wireless packet to STA1 from clinch STA5. The address table of each AP is taken as the condition of drawing 7 . The address field of the packet A-2 which STA5 transmits is AP5/STA1/STA5//.
[0036] Although AP5 which received this packet A-2 has not registered into an imputed table STA1 shown with a destination address, since it is registered (refer to drawing 7), it transmits a packet B-3 to an address table to the destination AP 2 corresponding to the destination STA 1

(S1, S2, S4, S8, S10, S11). The address field of this packet B-3 is AP2/AP5/STA1/STA5/.
[0037] AP2 which received this packet B-3 matches the source AP 5 the transmitting agency STA 5, and registers it into an address table (S5). Next, although STA1 shown with a destination address has not been registered into an imputed table, since it is registered to an address table, a packet B-4 is transmitted to the corresponding destination AP 1 (S6, S8, S10, S11). The address field of this packet B-4 is AP1/AP2/STA1/STA5/.
[0038] AP1 which received this packet B-4 matches the source AP 2 the transmitting agency STA 5, and registers it into an address table (S5). Next, since STA1 shown with a destination address is registered on an imputed table, a packet C-2 is transmitted to STA1 (8 S6, 9). The address field of this packet C-2 is STA1/STA5///. The condition of the address table of each AP after the packet transfer to STA1 shown above from STA5 is shown in drawing 9 . In addition, additional registration of the part of hatching is carried out in the packet transfer process from STA5 to STA1.
[0039] Drawing 10 shows the example which transmits a wireless packet to STA5 from STA1 again. The address table of each AP is taken as the condition of drawing 9 . The address field of the packet A-3 which STA1 transmits is AP1/STA5/STA1//.
[0040] Although AP1 which received this packet A-3 has not registered into an imputed table STA5 shown with a destination address, since it is registered (refer to drawing 9), it transmits a packet B-5 to an address table to corresponding AP2 (S1, S2, S4, S8, S10, S11). The address field of this packet B-5 is AP2/AP1/STA5/STA1/.
[0041] AP2 which received this packet B-5 matches the source AP 1 the transmitting agency STA 1, and updates an address table (S5). Next, although STA5 shown with a destination address has not been registered into an imputed table, since it is registered to an address table, a packet B-6 is transmitted to corresponding AP5 (S6, S8, S10, S11). The address field of this packet B-6 is AP5/AP2/STA5/STA1/.
[0042] AP5 which received this packet B-6 matches the source AP 2 the transmitting agency STA 1, and updates an address table (S5). Next, since STA5 shown with a destination address is registered on an imputed table, a packet C-3 is transmitted to STA5 (8 S6, 9). The address field of this packet C-3 is STA5/STA1///. The condition of the address table of each AP after the packet transfer to STA5 shown above from STA1 is the same as drawing 9 .
[0043] Drawing 11 shows the flow of operation at the time of packet reception of the base transceiver station AP in the study mold wireless packet transfer approach of claim 2. Drawing 11 (a) The shown flow of operation is inserted between S4 shown in drawing 5 , and S6. after the description of this flow of operation matches the transmitting agency address (the transmitting agency STA) and the sending-station address (source AP) and registers them into an address table, it starts (S5) and a registration hold timer -- making (S22) -- it is at the time. A registration hold timer corresponds to Registration STA by 1 to 1, and measures the continuation sheep time of delivery of the packet which makes registration STA the transmitting agency address.
[0044] For example, in the condition that the address table of each AP already shows drawing 9 , as shown in drawing 10 , when registered, the transmitting origin STA AP which received Packet B is first indicated to be in the transmitting agency address judges whether it registers with the address table (S21). And in being registered, it resets a registration hold timer (S23), and the transmitting former address (the transmitting agency STA) and the sending-station address (source AP) are matched, an address table is updated (S24), and the restart of the registration hold timer is carried out (S25). In the transmitting agency STA not being registered into an address table, registration processing is performed like the flow of drawing 5 of operation (S5), and a registration hold timer is started in it (S22).
[0045] moreover -- the time of fixed time amount reception of the packet which makes registration STA the transmitting agency address not being carried out, but a registration hold timer carrying out a time-out -- (S26) and drawing 11 (b) The transmitting agency address (the transmitting agency STA) and the sending-station address (source AP) which are matched are deleted from an address table so that it may be shown (S27). Thereby, the condition of an address table can always be held in the newest condition.

[0046] (Operation gestalt with which STA changes Attribution AP) Drawing 12 shows the wireless packet network with which the study mold wireless packet transfer approach of claim 3 is applied, and the address table of each AP. the thing of the operation gestalt which shows the tree structure between each AP to drawing 1 and 2 in drawing -- the same -- the imputed table and junction AP table of each AP -- drawing 3 (a) and (b) It is the same as what is shown.
[0047] However, each AP as well as STA shall generate, transmit and receive a packet itself, and the correspondence relation of AP shall also be registered into an address table with the following operation gestalten (claim 7). That is, each AP sets a local station MAC Address as the transmitting agency address, sets the MAC Address of Destination AP as a destination address, transmits to it, and incorporates the packet whose destination address corresponds with a local station MAC Address among receive packets. And according to an above-mentioned registration procedure, the transmitting agency address (the transmitting agency AP) and the sending-station address (source AP) are likened with matching, Destination AP, and Destination AP, and it registers with an address table. For example, by relaying AP1 and AP2 from AP3 (AP4), and transmitting a wireless packet to AP5, AP4, AP1, and AP3 and AP1 are matched, respectively, and by AP5, AP3, AP2 and AP4, and AP2, AP1 and AP2 are matched, respectively, and they are registered into an address table at AP2. It is drawing 12 (b) about the condition of a final address table. It is shown.
[0048] Drawing 13 shows the wireless terminal STA in the study mold wireless packet transfer approach (at the time of a hand off) of claim 3, and the flow of a base transceiver station AP of operation. When STA moves to a contiguity cel, (S30) and STA belong to the migration place AP, the migration place AP registers STA which newly belongs into an imputed table, and the information about the STA is deleted from an address table (S31). And the hand off packet (shown in drawing 4) which STA made the destination the migration origin AP which belonged till then to the migration place AP, and made the local station the transmitting agency is transmitted (S32).
[0049] Furthermore, each AP on the channel from the migration place AP to the moved material AP carries out the sequential transfer of the hand off packet, matches the transmitting former address and the sending-station address, and registers or updates it to an address table (S33). The migration origin AP which a hand off packet finally reaches matches the transmitting agency address and the sending-station address of a hand off packet, registers them into an address table, deletes the transmitting agency STA from an imputed table, and cancels attribution (S34).
[0050] Drawing 14 shows processing when STA5 moves to AP4 subordinate from AP5 subordinate in the wireless packet network of drawing 12 . In addition, the imputed table and junction AP table of each AP are drawing 3 (a) and (b). Considering as a condition, an address table is drawing 12 (b). It considers as a condition. Hereafter, it explains concretely, making the flow chart of drawing 13 correspond.
[0051] If STA5 belongs to AP4 after migration, AP4 will delete the relation between STA5 and AP1 registered into the address table, and it will register STA5 into an imputed table further (S31). And the destination transmits hand off packet AH-1 of the moved material AP 5 to AP4 (S32). In addition, AH A format of Packet A shows that data division are hand off packets. This address field of hand off packet AH-1 is AP4/AP5/STA5//.
[0052] AP4 which received this hand off packet AH-1 transmits hand off packet BH-1 to the destination AP 1 corresponding to the destination AP 5 based on an address table (S33). This address field of hand off packet BH-1 is AP1/AP4/AP5/STA5/.
[0053] AP1 which received this hand off packet BH-1 matches the source AP 4 the transmitting agency STA 5, and updates an address table (S33). Next, based on the address table of AP1, hand off packet BH-2 are transmitted to the destination AP 2 corresponding to the destination AP 5. This address field of hand off packet BH-2 is AP2/AP1/AP5/STA5/.
[0054] AP2 which received these hand off packet BH-2 matches the transmitting agency AP 1 the transmitting agency STA 5, and updates an address table. Next, since AP5 shown with a destination address has not been registered into an address table, based on a junction AP table (drawing 3 (b)), hand off packet BH-3 are transmitted to AP5. This address field of hand off packet BH-3 is AP5/AP2/AP5/STA5/.

[0055] AP5 which received these hand off packet BH-3 matches the source AP 2 the transmitting agency STA 5, registers it into an address table, and deletes STA5 from an imputed table further (S34). the condition of the address table after the hand off packet transfer to AP5 shown above from STA5, and an imputed table -- drawing 15 (a) and (b) It is shown. In addition, the part of hatching is registered, updated or deleted in the packet transfer process from STA5 to AP5.
[0056] Drawing 16 shows the example which transmits a wireless packet to STA5 from STA1. The address table and imputed table of each AP are made into the condition of drawing 15 . This transfer operation is based on the flow chart of drawing 5 . The address field of the packet A-4 which STA1 transmits is AP1/STA5/STA1//.
[0057] Although AP1 which received this packet A-4 has not registered into an imputed table STA5 shown with a destination address, since it is registered (refer to drawing 15), it transmits a packet B-7 to an address table to corresponding AP4. The address field of this packet B-7 is AP4/AP1/STA5/STA1/.
[0058] AP4 which received this packet B-7 matches the source AP 1 the transmitting agency STA 1, and updates an address table. Next, based on an imputed table, a packet C-4 is transmitted to STA5. The address field of this packet C-4 is STA5/STA1///. The condition of the address table of each AP after the packet transfer to STA1 shown above from STA5 is the same as drawing 15 .
[0059] (Operation gestalt from which STA changes wireless connection and cable connection mutually) Drawing 17 shows the example of a configuration of the wireless packet network with which the study mold wireless packet transfer approach of claim 4 is applied.
[0060] drawing -- setting -- the wireless packet network with the above-mentioned tree structure between each AP -- the same -- the junction AP table of each AP -- drawing 3 (b) It becomes like. Here, STA1 belongs to AP1, STA5 shows the example which belongs to AP4, and the address table and imputed table of each AP become like drawing 15 .
[0061] Moreover, the cable correspondences STA and STA1 which have a cable interface for connecting usual AP and STA5 to Cable LAN set to the usual STA cable correspondences AP, AP2-AP5 which have a cable interface for connecting AP1 to Cable LAN. Interface **2 of the learning bridge of Cable LAN are connected with AP1. In addition, AP1 is also equipped with the function of the learning bridge for the packet transfer between a cable interface and a wireless interface.
[0062] Drawing 18 shows a learning bridge and the study table of AP1. All STAs and all AP shall be registered into each study table by the registration procedure accompanying an above-mentioned packet transfer. That is, interface **2 are matched with all STAs and all AP on the study table of a learning bridge. Moreover, on the study table of AP1, all STAs, and AP2-5 and a wireless interface are matched.
[0063] Drawing 19 shows the flow of the wireless terminal STA and a base transceiver station AP of operation in the study mold wireless packet transfer approach of claim 4. (a) The case where the ****** correspondence STA carries out a connection substitute to cable connection from wireless connection is shown. (b) The case where the ****** correspondence STA carries out a connection substitute to wireless connection from cable connection is shown.
[0064] Drawing 19 (a) It sets, and if a connection substitute is carried out to cable connection from the wireless connection with AP (the moved material AP) to which the cable correspondence STA belongs now (S40), the hand off packet which the cable correspondence STA made the moved material AP the destination to the cable packet network, and made the local station the transmitting agency will be transmitted (S41). A cable packet network transmits the hand off packet which received to the cable correspondence AP through a learning bridge (S42). If the cable correspondence AP receives a hand off packet, according to a tree-like channel, it will transmit to low order AP. Each AP on the channel from the cable correspondence AP to the moved material AP carries out the sequential transfer of the hand off packet, matches the transmitting former address and the sending-station address, and registers or updates it to an address table (S43). The migration origin AP which a hand off packet finally reaches matches the transmitting agency address and the sending-station address of a hand off packet, registers

them into an address table, and deletes the transmitting agency STA from an imputed table (S44).

[0065] Drawing 19 (b) If it sets and the cable correspondence STA carries out a connection substitute to the wireless connection with AP (migration place AP) from cable connection (S45), the cable correspondence STA will transmit the wireless connection packet which made the local station the transmitting agency to the migration place AP (S46). The migration place AP will be transmitted to a high order AP according to a tree-like channel, if this wireless connection packet is received. Each AP on the channel from the migration place AP to the cable correspondence AP carries out the sequential transfer of the wireless connection packet, matches the transmitting former address and the sending-station address, and registers or updates it to an address table (S47). The cable correspondence AP carries out broadcasting transmission of the wireless connection packet from a cable interface to a cable packet network (S48).

[0066] Drawing 20 shows processing when STA5 changes to cable connection in the wireless packet network of drawing 17 . The following and drawing 19 (a) It explains concretely, making a flow chart correspond.

[0067] If STA5 separates from the migration origin AP 4 which is carrying out current attribution and it connects with Cable LAN (S40), the destination will transmit hand off packet DH-1 of AP4 to Cable LAN (S41). In addition, DH It is shown that it is a hand off packet among the packets of Cable LAN.

[0068] The learning bridge which received this hand off packet DH-1 transmits interface **2 to hand off packet DH-2 based on the study table of drawing 18 (S42), matches interface **1 with STA5, and updates a study table. When these hand off packet DH-2 are received, AP1 matches STA5 and a cable interface, updates a study table, and is drawing 15 (a). STA5 is deleted from an address table. Furthermore, AP1 changes hand off packet DH-2 into hand off packet BH-4 of a wireless packet format, and transmits to AP4 of the destination (S43). This address field of hand off packet BH-4 is AP4/AP1/AP4/STA5/.

[0069] The migration origin AP 4 which received these hand off packet BH-4 matches the source AP 1 shown in the transmitting agency STA 5 and the sending-station address which are shown in the transmitting agency address, registers it into an address table, and deletes STA5 from an imputed table further (S44).

[0070] the condition of each study table after the hand off packet transfer to AP4 shown above from STA5 -- drawing 21 -- being shown -- the condition of the address table of each AP, and an imputed table -- drawing 22 (a) and (b) It is shown. In addition, the part of hatching is registered, updated or deleted in the hand off packet transfer process from STA5 to AP4.

[0071] Drawing 23 shows the example which transmits a wireless packet to STA5 from STA1. A learning bridge and the study table of AP1 are made into the condition of drawing 21 , and the address table and imputed table of each AP are made into the condition of drawing 22 . The address field of the packet A-5 which STA1 transmits is AP1/STA5/STA1//.

[0072] AP1 which received this packet A-5 changes the packet addressed to STA5 into the packet format of Cable LAN based on a study table, and transmits to Cable LAN. The learning bridge which received this packet D-1 transmits the packet D-2 addressed to STA5 from interface **1 based on a study table. STA5 receives this packet D-2 from Cable LAN.

[0073] Drawing 24 shows processing when STA5 moves to AP3 subordinate from cable connection. In addition, each study table is made into the condition of drawing 21 , and the address table and imputed table of each AP are drawing 22 (a) and (b). It considers as a condition. The following and drawing 19 (b) It explains concretely, making a flow chart correspond.

[0074] STA5 belongs to AP3 after migration, and transmits wireless connection packet AC-1 to AP3 (S46). In addition, AC A format of Packet A shows that data division are wireless connection packets.

[0075] When STA5 became a subordinate, AP3 which received this wireless connection packet AC-1 deletes the relation between STA5 and AP1 registered into the address table, and registers STA5 into an imputed table further. Next, wireless connection packet BC-1 is

transmitted to the destination AP 1 (S47). AP1 which received this wireless connection packet BC-1 changes a wireless connection packet into the packet format of Cable LAN based on a study table, carries out broadcasting transmission at Cable LAN, and updates the address table on Cable LAN (S48).
[0076] the condition of each study table after the wireless connection packet transfer to the learning bridge shown above from STA5 -- drawing 25 -- being shown -- the condition of the address table of each AP, and an imputed table -- drawing 26 (a) and (b) It is shown. In addition, the part of hatching is registered, updated or deleted in the wireless connection packet transfer process from STA5 to a learning bridge.
[0077] Drawing 27 shows the example which transmits a wireless packet to STA5 from STA1. A learning bridge and the study table of AP1 are made into the condition of drawing 25 , and the address table and imputed table of each AP are made into the condition of drawing 26 . The address field of the packet A-6 which STA1 transmits is AP1/STA5/STA1//.
[0078] Although AP1 which received this packet A-6 has not registered into an imputed table STA5 shown with a destination address, since it is registered to an address table, it transmits a packet B-8 to corresponding AP3. The address field of this packet B-8 is AP3/AP1/STA5/STA1/.
[0079] AP3 which received this packet B-8 matches the source AP 1 the transmitting agency STA 1, and updates an address table. Next, since STA5 shown with a destination address is registered on an imputed table, a packet C-5 is transmitted to STA5. The address field of this packet C-5 is STA5/STA1///. The condition of the address table of each AP after the packet transfer to STA1 shown above from STA5 is the same as drawing 26 .
[0080] (Operation gestalt to which AP carries out a channel change) Drawing 28 shows the wireless packet network with which the study mold wireless packet transfer approach of claims 5 and 6 is applied, and the address table of each AP.
[0081] In drawing, AP6 shall be connected to AP5 of the wireless packet network of drawing 12 , and, as for the tree structure between each AP, STA6 shall belong to AP6. In the address table of each AP, it is drawing 28 (b). All STAs and all AP shall be registered by the registration procedure accompanying a packet transfer like. Similarly, the imputed table and junction AP table of each AP are drawing 29 (a) and (b). It becomes like.
[0082] Here, a shelter etc. appears between AP2 and AP5, and the case where a channel in the meantime is intercepted is assumed. At this time, AP5 changes a channel with a high order AP to AP4 from AP2. The tree structure between AP before and behind this change is shown in drawing 30 .
[0083] Drawing 31 shows the flow of the wireless terminal STA and a base transceiver station AP of operation in the study mold wireless packet transfer approach (at the time of a channel change) of claim 5. Drawing 32 shows processing when AP5 changes a channel to AP4 from AP2. In addition, the address table of each AP is drawing 28 (b). The imputed table and junction AP table of each AP are drawing 29 (a) and (b). It considers as a condition. Hereafter, it explains concretely, making the flow chart of drawing 31 correspond.
[0084] When AP5 changes a channel with the changing agency AP 2 to the change place AP 4 and belongs to the change place AP 4 (S50), it is drawing 29 (b). The high order AP 2 registered into the shown junction AP table of AP5 is updated on a high order AP 4, and low order AP 5 is registered into the junction AP table of AP4 (refer to drawing 33). Moreover, drawing 28 (b) AP2 relation registered into the address table of shown AP5 is deleted (S51).
[0085] Next, AP5 extracts all STAs matched with AP other than changing agency AP2, all STAs under registration on an imputed table, and all AP of the low order under registration on a junction AP table out of STA under registration to an address table (S52). Here, STA6 and AP6 are extracted. hand off directions packet BR- directed that AP5 transmits a hand off packet to the changing agency AP 2 to STA6 and AP6 which were extracted -- sequential transmission of 1 and 2 is carried out (S53). In addition, BR The format of Packet B shown in drawing 4 shows that data division are hand off directions packets.
[0086] AP6 which received hand off directions packet BR-1 addressed to STA6 transmits hand off directions packet CR-1 addressed to STA6 further (S53). In addition, CR The format of

Packet C shown in drawing 4 shows that data division are hand off directions packets.
[0087] Hand off packet AH-2 which STA6 which received this hand off directions packet CR-1 made the changing agency AP 2 the destination, and made the local station the transmitting agency are transmitted (S54). AP6 which received these hand off packet AH-2 transmits a hand off packet to the changing agency AP 2 of that destination like the transfer processing of a hand off packet shown in drawing 14 .
[0088] That is, AP6 transmits hand off packet BH-5 to the destination AP 5 of the destination AP 2 based on an address table (S55). This address field of hand off packet BH-5 is AP5/AP6/AP2/STA6/.
[0089] AP5 which received these hand off packet BH-5 matches the source AP 6 the transmitting agency STA 6, and updates an address table (S55). Next, since AP2 shown with a destination address has not been registered into an address table (AP2 relation already deletes), based on the junction AP table of drawing 33 , hand off packet BH-6 are transmitted to AP2 of a high order. This address field of hand off packet BH-6 is AP4/AP5/AP2/STA6/.
[0090] AP4 which received these hand off packet BH-6 matches the transmitting agency AP 5 the transmitting agency STA 6, and updates an address table. Next, based on an address table, hand off packet BH-7 are transmitted to the destination AP 1 of the destination AP 2. This address field of hand off packet BH-7 is AP1/AP4/AP2/STA6/.
[0091] AP1 which received these hand off packet BH-7 matches the source AP 4 the transmitting agency STA 6, and updates an address table. Next, based on a junction AP table, hand off packet BH-8 are transmitted to low-ranking AP2. This address field of hand off packet BH-8 is AP2/AP1/AP2/STA6/. AP2 which received these hand off packet BH-8 matches the source AP 1 the transmitting agency STA 6, and updates an address table (S56).
[0092] The hand off packet which similarly AP6 and AP5 self which received hand off directions packet BR-2 made the changing agency AP 2 the destination, respectively, and made the local station the transmitting agency is transmitted (S54). This hand off packet is transmitted to AP2 like BH-5-BH-8 shown in drawing 32 , matches each destination AP the transmitting agency AP6 and AP5, and updates the address table of each AP (S55, S56).
[0093] Moreover, AP2 regards it as what AP5 moved to other AP subordinates when a transmitting agency received the hand off packet of AP5 by AP1 course, and AP5 is deleted from a junction AP table (S56).
[0094] The condition of the junction AP table of each AP after each hand off packet transfer shown above and an address table is shown in drawing 33 and 34. In addition, the part of hatching is registered, updated or deleted in each hand off packet transfer process. Moreover, the part shown by parenthesis writing is registered in the transfer process of the wireless packet after it.
[0095] Drawing 35 shows the example which transmits a wireless packet to STA5 from STA1. The junction AP table and address table of each AP are taken as drawing 33 and the condition of 34. The address field of the packet A-7 which STA1 transmits is AP1/STA6/STA1//.
[0096] AP1 which received this packet A-7 transmits a packet B-9 to the destination AP 4 based on an address table. The address field of this packet B-9 is AP4/AP1/STA6/STA1/.
[0097] AP4 which received this packet B-9 matches the source AP 1 the transmitting agency STA 1, updates an address table, and transmits a packet B-10 to the destination AP 5 based on an address table. The address field of this packet B-10 is AP5/AP4/STA6/STA1/.
[0098] AP5 which received this packet B-10 matches the source AP 4 the transmitting agency STA 1, updates an address table, and transmits a packet C-6 to STA6 based on an imputed table. The address field of this packet C-6 is STA6/STA1///. The condition of the address table of each AP after the packet transfer to STA6 shown above from STA1 is the same as drawing 34 . In addition, STA1 and AP4 which were shown in the address table of AP5 by parenthesis writing at this time are registered.
[0099] Drawing 36 shows the flow of the wireless terminal STA and a base transceiver station AP of operation in the study mold wireless packet transfer approach (at the time of a channel change) of claim 6. Drawing 37 shows processing when AP5 changes a channel to AP4 from AP2. In addition, the address table of each AP is drawing 28 (b). The imputed table and junction AP

table of each AP are drawing 29 (a) and (b). It considers as a condition. Hereafter, it explains concretely, making the flow chart of drawing 36 correspond.
[0100] When AP5 changes a channel with the changing agency AP 2 to the change place AP 4 and belongs to the change place AP 4 (S60), it is drawing 29 (b). The high order AP 2 registered into the shown junction AP table of AP5 is updated on a high order AP 4, and low order AP 5 is registered into the junction AP table of AP4 (refer to drawing 33). Moreover, drawing 28 (b) AP2 relation registered into the address table of shown AP5 is deleted (S61).
[0101] Next, AP5 extracts all STAs matched with AP other than changing agency AP2, all STAs under registration on an imputed table, and all AP of the low order under registration on a junction AP table out of STA under registration to an address table (S62). Here, STA6 and AP6 are extracted. Sequential transmission of the hand off packet BH-9 which AP5 made the changing agency AP 2 the destination as a substitute of STA6 and AP6 which were extracted, and made STA6 or AP6 the transmitting agency is carried out (S63). This address field of hand off packet BH-9 is AP4/AP5/AP2/STA6/AP4/AP5/AP2/AP6/.
[0102] AP4 which received these hand off packet BH-9 matches the transmitting agency AP 5 the transmitting agency STA6 and AP6, and updates an address table (S64). Next, based on an address table, hand off packet BH-10 are transmitted to the destination AP 1 of the destination AP 2. This address field of hand off packet BH-10 is AP1/AP4/AP2/STA6/AP1/AP4/AP2/AP6/.
[0103] AP1 which received these hand off packet BH-10 matches the source AP 4 the transmitting agency STA6 and AP6, and updates an address table (S64). Next, based on a junction AP table, hand off packet BH-11 are transmitted to low-ranking AP2. This address field of hand off packet BH-11 is AP2/AP1/AP2/STA6/AP2/AP1/AP2/AP6/. AP2 which received these hand off packet BH-11 matches the source AP 1 the transmitting agency STA6 and AP6, and updates an address table (S65).
[0104] Similarly, the hand off packet which AP5 made the changing agency AP 2 the destination, and made the local station the transmitting agency is transmitted (S63). This hand off packet is transmitted to AP2 like BH-9-BH-11 shown in drawing 37 , matches each destination AP the transmitting agency AP 5, and updates the address table of each AP (S64, S65).
[0105] Moreover, AP2 regards it as what AP5 moved to other AP subordinates when a transmitting agency received the hand off packet of AP5 by AP1 course, and AP5 is deleted from a junction AP table (S65).
[0106] The condition of the junction AP table of each AP after each hand off packet transfer shown above and an address table is the same as drawing 33 and the thing shown in 34. It is carried out as well as drawing 35 when transmitting a wireless packet to STA5 from STA1.
[0107] (Example of a configuration of a base transceiver station AP) Drawing 38 shows the example of a configuration of the base transceiver station AP of claims 8, 10-13. In drawing, a base transceiver station AP is constituted by the wireless interface 11, the receive-packet judging section 12, a control section 13, the imputed table 14, an address table 15, the junction AP table 16, and the transmitting packet generation section 17, and performs processing based on the study mold wireless packet transfer approach of claims 1, 3, 5, and 6.
[0108] The wireless interface 11 performs processing which transmits Packets B and C while it receives Packets A and B and incorporates the packet addressed to a local station (S1-S3 of drawing 5 , S9, S11, S13). The receive-packet judging section 12 judges the packet A to which the receive packet addressed to a local station was transmitted from STA, the packet B transmitted from other AP, the hand off packet further accompanying STA migration, the hand off directions packet accompanying AP imputed modification, and a hand off packet, and makes the processing to which it corresponds by the control section 13, respectively perform (S4 of drawing 5).
[0109] According to the classification of a receive packet, with reference to the imputed table 14, an address table 15, and the junction AP table 16, a control section 13 performs renewal of registration of each table if needed, and determines the destination (S5-S10 of drawing 5 , 12 and 14, S32-34 of drawing 13 , drawing 13 , drawing 19 , drawing 31 , drawing 36). The transmitting packet generation section 17 generates the packet B according to the destination,

or Packet C, and sends it out to the wireless interface 11 (S9 of drawing 5 , S11, S13).
[0110] Drawing 39 shows the example of a configuration of the base transceiver station AP of claim 9. In drawing, a base transceiver station AP is constituted by the wireless interface 11, the receive-packet judging section 12, a control section 13, the imputed table 14, an address table 15, the junction AP table 16, the transmitting packet generation section 17, and the registration hold timer 18, and performs processing based on the study mold wireless packet transfer approach of claim 2.
[0111] The description of Book AP connects the registration hold timer 18 to a control section 13, and when the time-out of the continuation sheep time of delivery of the packet which makes STA registered into the address table the transmitting agency address is measured and carried out, it is in the place which deletes information STA-related [the] (drawing 11). Other configurations are the same as that of AP of drawing 38 .
[0112] Drawing 40 shows the example of a configuration of the base transceiver station AP corresponding to a cable of claim 11. In drawing, the base transceiver station AP corresponding to a cable is constituted by the wireless interface 11, the receive-packet judging section 21, a control section 22, the imputed table 14, an address table 15, the junction AP table 16, the study table 23, the transmitting packet generation section 24, and the cable interface 25, and performs processing based on the study mold wireless packet transfer approach of claim 4.
[0113] When the cable correspondence STA changes from the cable connection from wireless connection, and cable connection to wireless connection, the receive-packet judging section 21 detects the hand off packet or wireless connection packet received by the wireless interface 11 or the cable interface 25, and makes the processing which corresponds by the control section 22 perform. According to a hand off packet or a wireless connection packet, with reference to the imputed table 14, an address table 15, the junction AP table 16, and the study table 23, a control section 22 performs renewal of registration of each table if needed, and determines the destination (drawing 19). The transmitting packet generation section 24 generates the hand off packet or wireless connection packet according to the destination, and sends it out to the wireless interface 11 or the cable interface 25. The wireless interface 11 or the cable interface 25 generates the transmitting packet according to each packet format on a wireless circuit or Cable LAN, and is transmitted to it, respectively. In addition, about transmission and reception of the usual wireless packet, the same processing as AP shown in drawing 38 is performed.
[0114]
[Effect of the Invention] As explained above, the base transceiver station matched with the address table can be chosen as the destination, and, as for the base transceiver station using the study mold wireless packet transfer approach and this approach of claims 1 and 8, even a destination wireless terminal can transmit a packet. Therefore, since a useless packet transfer can be prevented compared with the approach of transmitting to all the base transceiver stations that can communicate, the increment in the equipment scale of a base transceiver station or power consumption can be suppressed, and a radio frequency resource can be utilized effectively, and the fall of a throughput can be prevented.
[0115] Moreover, even when the number of the interfaces of a base transceiver station is one, by matching a wireless terminal and a base transceiver station logically by the MAC Address, a destination base transceiver station can be chosen, it can transmit, and the equipment scale and power consumption of a base transceiver station can be stopped to the minimum.
[0116] Moreover, by choosing a destination base transceiver station not using broadcasting transmission of a retrieval frame or all path planning frames, since the packet transfer is possible even for a destination wireless terminal, improvement in a throughput can be aimed at.
[0117] By managing the continuation sheep time of delivery of the packet which makes the wireless terminal registered into the address table the transmitting agency address, and deleting registration by time over, invention of claims 2 and 9 can always hold an address table in the newest condition, and can use it efficiently.
[0118] When a wireless terminal moves to the cel of other base transceiver stations, by transfer of a hand off packet, invention of claims 3 and 10 can update the address table and imputed table of a base transceiver station on a junction path, and can prevent an incorrect transfer of

the packet accompanying a status change.
[0119] When the wireless terminal corresponding to a cable changes from wireless connection to cable connection, or when it changes from cable connection to wireless connection, by transfer of a hand off packet or a wireless connection packet, invention of claims 4 and 11 can update the address table and imputed table of a base transceiver station on a junction path, and can prevent an incorrect transfer of the packet accompanying a status change.
[0120] When a base transceiver station changes a channel with the base transceiver station of a high order, by making a hand off packet transmit to the subordinate's wireless terminal and base transceiver station by the hand off directions packet, invention of claims 5 and 12 can update the address table of the base transceiver station on a junction path, and can prevent an incorrect transfer of the packet accompanying a status change.
[0121] When a base transceiver station changes a channel with the base transceiver station of a high order, by transmitting the hand off packet made into transmitting [each] origin as the subordinate's wireless terminal, and a substitute of a base transceiver station, invention of claims 6 and 13 can update the address table of the base transceiver station on a junction path, and can prevent an incorrect transfer of the packet accompanying a status change.
[0122] Since invention of claim 7 can match a destination base transceiver station and the base transceiver station of the destination by the address table, it can perform efficiently a transfer of the hand off packet which makes a base transceiver station the destination as well as a data packet.

[Translation done.]

* NOTICES *

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TECHNICAL FIELD

[Field of the Invention] This invention relates to the packet transfer approach of a wireless packet network. Especially, it is (1). The wireless packet transfer between base transceiver stations, and (2) When the wireless terminal corresponding to a cable moves in a base transceiver station, it is related with the study mold wireless packet transfer approach used for a packet transfer path change when the wireless packet path change when changing cable connection and wireless connection and (3) base transceiver stations change a high order base transceiver station. Furthermore, it is related with the configuration of the base transceiver station using this approach.

[Translation done.]

PRIOR ART

[Description of the Prior Art] In the network of a cable, there are a packet transfer approach by the learning bridge (transparent bridge), the packet transfer approach by the source routing bridge, etc.
[0003] Drawing 41 shows the network example which used the learning bridge (conventional technique 1). A learning bridge has interface **1, **2, and **3, and terminals PC1, PC2, and PC3 are connected to each interface, respectively. If a learning bridge receives a packet, the interface which received the MAC Address and packet of a transmitting agency terminal will be matched, and it will memorize on a study table. Here, PC 1 and**1, PC 2 and**2, and PC 3 and**3 are matched.
[0004] When the interface which a destination terminal is registered into a study table, and is matched is not an interface which received the packet, a packet is transmitted from the interface matched with the destination terminal. In the case of the interface with which the interface which a destination terminal is registered into a study table, and is matched received the packet, a packet is discarded. When the destination terminal is not registered into a study table, a packet is transmitted from all interfaces other than the interface which received the packet.
[0005] Drawing 42 shows the network example which used the source routing bridge (conventional technique 2). The source routing bridge B1 and B-2 have interface **1 and **2, respectively, and interface **1 of interface **2 and source routing bridge B-2 of the source routing bridge B1 is connected. Moreover, terminals PC1 and PC2 are connected to each interface of the source routing bridge B1, respectively, and terminals PC1 and PC3 are connected to each interface of source routing bridge B-2, respectively.
[0006] If a packet is received, based on the routing information directed to the header unit of a packet, the source routing bridge B1 and B-2 will choose the next destination source routing bridge, and will transmit a packet. A transmit terminal broadcasts the retrieval frame which contains the MAC Address of a destination terminal first, when transmitting a data packet. The destination terminal which received this retrieval frame broadcasts all the path planning frames that gave the MAC Address of that transmit terminal. The source routing bridge which received all these path planning frames writes in the identifier of a local station, and transmits it to other source routing bridges.
[0007] Out of two or more received path planning frames of all, a transmit terminal chooses all path planning frames with few identifiers of the source routing bridge written in, for example, and memorizes them on a path information table. For example, drawing 42 (b) As path information on a terminal PC 3, "B1, **2, B-2, **2" are registered into the path information table of a terminal PC 1, and "B1, **2" are registered into it as path information on a terminal PC 2 so that it may be shown. A transmit terminal is drawing 42 (c) as routing information to the header unit of a data packet. The permutation of the identifier of the source routing bridge written in all the selected path planning frames is copied, and it transmits so that it may be shown.

[Translation done.]

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EFFECT OF THE INVENTION

[Effect of the Invention] As explained above, the base transceiver station matched with the address table can be chosen as the destination, and, as for the base transceiver station using the study mold wireless packet transfer approach and this approach of claims 1 and 8, even a destination wireless terminal can transmit a packet. Therefore, since a useless packet transfer can be prevented compared with the approach of transmitting to all the base transceiver stations that can communicate, the increment in the equipment scale of a base transceiver station or power consumption can be suppressed, and a radio frequency resource can be utilized effectively, and the fall of a throughput can be prevented.
[0115] Moreover, even when the number of the interfaces of a base transceiver station is one, by matching a wireless terminal and a base transceiver station logically by the MAC Address, a destination base transceiver station can be chosen, it can transmit, and the equipment scale and power consumption of a base transceiver station can be stopped to the minimum.
[0116] Moreover, by choosing a destination base transceiver station not using broadcasting transmission of a retrieval frame or all path planning frames, since the packet transfer is possible even for a destination wireless terminal, improvement in a throughput can be aimed at.
[0117] By managing the continuation sheep time of delivery of the packet which makes the wireless terminal registered into the address table the transmitting agency address, and deleting registration by time over, invention of claims 2 and 9 can always hold an address table in the newest condition, and can use it efficiently.
[0118] When a wireless terminal moves to the cel of other base transceiver stations, by transfer of a hand off packet, invention of claims 3 and 10 can update the address table and imputed table of a base transceiver station on a junction path, and can prevent an incorrect transfer of the packet accompanying a status change.
[0119] When the wireless terminal corresponding to a cable changes from wireless connection to cable connection, or when it changes from cable connection to wireless connection, by transfer of a hand off packet or a wireless connection packet, invention of claims 4 and 11 can update the address table and imputed table of a base transceiver station on a junction path, and can prevent an incorrect transfer of the packet accompanying a status change.
[0120] When a base transceiver station changes a channel with the base transceiver station of a high order, by making a hand off packet transmit to the subordinate's wireless terminal and base transceiver station by the hand off directions packet, invention of claims 5 and 12 can update the address table of the base transceiver station on a junction path, and can prevent an incorrect transfer of the packet accompanying a status change.
[0121] When a base transceiver station changes a channel with the base transceiver station of a high order, by transmitting the hand off packet made into transmitting [each] origin as the subordinate's wireless terminal, and a substitute of a base transceiver station, invention of claims 6 and 13 can update the address table of the base transceiver station on a junction path, and can prevent an incorrect transfer of the packet accompanying a status change.
[0122] Since invention of claim 7 can match a destination base transceiver station and the base transceiver station of the destination by the address table, it can perform efficiently a transfer of the hand off packet which makes a base transceiver station the destination as well as a data

packet.

[Translation done.]

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] Each calls drawing 41 and the conventional techniques 1 and 2 shown in 42 at the network of a cable, and if this is applied to a packet transfer of the wireless packet network which consists of a base transceiver station and a wireless terminal, the following problems will produce them.

[0009] With the conventional technique 1 shown in drawing 41 , a learning bridge has two or more interfaces, matches the interface which received the transmit terminal and the packet concerned at the time of packet reception, and registers it into a study table. In order for a base transceiver station to have the same function as a learning bridge, it is necessary to have two or more interfaces first. However, the antenna and strange demodulator circuit which constitute the interface of a base transceiver station are complicated compared with the interface of a learning bridge, and have the problem to which the equipment scale of a base transceiver station becomes large. Moreover, since power consumption also increases suddenly two or more antennas and strange demodulator circuits, available time will be restricted when a base transceiver station is a cell drive.

[0010] If the conventional technique 2 shown in drawing 42 is applied to a wireless packet network, all the wireless terminals that transmit a packet need to carry out broadcasting transmission of the retrieval frame, in order to acquire routing information, and a destination wireless terminal needs to carry out broadcasting transmission of all the path planning frames. That is, whenever the first packet transmission and a transmitting agency wireless terminal change, two broadcasting transmission, a retrieval frame and all path planning frames, is needed. However, generally compared with a cable network, there is a problem to which the effect of the throughput fall by two broadcasting transmission, a retrieval frame and all path planning frames, becomes large in a wireless network with little transmission capacity.

[0011] This invention aims at offering the base transceiver station using the study mold wireless packet transfer approach and this approach of enabling a packet transfer, without being accompanied by the equipment scale of a base transceiver station, and the increment in power consumption in the wireless packet communication system which consists of a base transceiver station and a wireless terminal.

[0012] Moreover, in the wireless packet communication system which consists of a base transceiver station and a wireless terminal, in case this invention judges the suitable base transceiver station which a base transceiver station transmits to a degree, it aims at offering the base transceiver station using the study mold wireless packet transfer approach and this approach of making unnecessary broadcasting transmission of a retrieval frame or all path planning frames, and enabling a deployment of a radio frequency resource.

[Translation done.]

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MEANS

[Means for Solving the Problem] The base transceiver station using the study mold wireless packet transfer approach and this approach of claim 1 uses that the packet B to which between base transceiver stations is transmitted has the transmitting agency address and the sending-station address. Namely, the base transceiver station which received Packet B matches the transmitting agency wireless terminal / base transceiver station shown in the transmitting agency address, and the source base transceiver station shown in the sending-station address, and registers it into an address table. Moreover, the packet B which searches the transmitting agency address (a transmitting agency wireless terminal / base transceiver station) of registration to an address table about the destination wireless terminal / base transceiver station shown with the destination address of Packet B, and makes the corresponding sending-station address (source base transceiver station) the receiving station address (destination base transceiver station) is generated. Thereby, the destination base transceiver station corresponding to a destination wireless terminal / base transceiver station can be known, and transfer processing can be performed promptly.
[0014] In addition, in a destination wireless terminal not being registered into the address table of all base transceiver stations, although the first transmitting packet is transmitted to all base transceiver stations, the registered packet addressed to a wireless terminal is not concerned with a transmitting agency wireless terminal, but the destination is determined based on an address table. Moreover, renewal of an address table is also performed each time. Therefore, whenever the first packet transmission and a transmitting agency wireless terminal change, a throughput can be raised compared with the conventional technique which needs two broadcasting transmission, a retrieval frame and all path planning frames.
[0015] When a wireless terminal moves to the cel of other base transceiver stations and the wireless terminal corresponding to a cable changes from wireless connection to cable connection, each wireless terminal transmits the hand off packet made into transmitting [a local station] origin to addressing to a moved material base transceiver station which belonged at the beginning (claims 3 and 4). Moreover, when the wireless terminal corresponding to a cable changes from cable connection to wireless connection, the wireless connection packet made into transmitting [a station local station] origin is transmitted, each base transceiver station transmits a wireless connection packet to the base transceiver station corresponding to a cable, and the base transceiver station corresponding to a cable carries out BURODE cast transmission in a cable network (claim 4). By transfer of this hand off packet or a wireless connection packet, the information on the address table of each base transceiver station is updated, and even if each status change occurs, the transfer path of a packet can be promptly determined based on an address table.
[0016] When a base transceiver station changes a channel with a high order base transceiver station (changing agency base transceiver station) to another base transceiver station (change place base transceiver station) and it belongs to a change place base transceiver station All the wireless terminals matched with base transceiver stations other than a changing agency base transceiver station out of the wireless terminal under registration to the address table of a local station, All the base transceiver stations of the low order under registration on all the wireless

terminals under registration on an imputed table and a junction base transceiver station table are extracted, and it directs to transmit a hand off packet to a changing agency base transceiver station to all the wireless terminals and all base transceiver stations (claim 5). Moreover, instead of all the wireless terminals and all the base transceiver stations which were extracted by the above, the base transceiver station which makes an imputed change is made into transmitting [them] origin, and carries out substitute transmission of the hand off packet at a changing agency base transceiver station (claim 6).
[0017] By transmitting such a hand off packet to a changing agency base transceiver station, the information on the address table of each base transceiver station is updated, and even if each status change occurs, the transfer path of a packet can be promptly determined based on an address table.
[0018]
[Embodiment of the Invention] (Basic operation gestalt) Drawing 1 shows the example of a configuration of the wireless packet network with which the study mold wireless packet transfer approach of claims 1 and 2 is applied.
[0019] In drawing, AP shows a base transceiver station and STA shows a wireless terminal. Base transceiver stations AP1-AP5 transmit periodically the beacon signal which gave the local station MAC Address, respectively, and the range which the signal reaches is called cel (a broken line shows). The wireless terminal STA will transmit an STA imputed signal to the transmitting origin AP, if a beacon signal is received. AP which received the STA imputed signal judges that the transmitting origin STA exists in a local station cel, and is registered into an imputed table. In the example of drawing 1 , STA1 belongs to AP1 and STA5 belongs to AP5. AP may notify the completion of imputed to STA for the improvement in dependability. It is drawing 3 (a) about the imputed table which registered STA to which each AP exists in a local station cel here. It is shown.
[0020] Moreover, it sets up so that a loop formation may not generate the junction way between AP beforehand. The above-mentioned beacon signal is used for a setup of this junction way. A wireless packet network-control person chooses one specification AP used as the root (root). In the example of drawing 1 , it is AP1. First, AP1 transmits a beacon signal periodically. AP which received the beacon signal transmits AP imputed signal to the transmitting agency AP 1. In the example of drawing 1 , AP2, AP3, and AP4 receive the beacon signal of AP1, and they transmit AP imputed signal to AP1. AP1 which received AP imputed signal judges AP2-AP4 to be AP in which junction is possible, and registers them into a junction AP table. Moreover, AP2-AP4 are registered into a junction AP table by making AP1 into a high order AP. AP1 may notify the completion of imputed to AP2-AP4 for the improvement in dependability.
[0021] Then, AP2-AP4 start transmission of a beacon signal respectively similarly. At this time, a high order AP disregards the beacon signal from low order AP. Moreover, AP which has registered the common high order AP disregards a mutual beacon signal. In the example of drawing 1 , AP5 receives the beacon signal from the both sides of AP2 and AP4. AP5 chooses one from the transmitting origin AP of a beacon signal, and transmits AP imputed signal. Or the received field strength of a beacon signal chooses the greatest AP as the selection approach, the receiving error rate of a beacon signal chooses the minimum AP, or the field which shows the traffic volume of AP is prepared in a beacon signal, and there is the approach of the traffic volume choosing the minimum AP. In the example of drawing 1 , AP5 chooses AP2 and transmits AP imputed signal. In addition to AP1, AP2 which received AP imputed signal registers AP5 into a junction AP table. Moreover, AP5 is registered into a junction AP table by making AP2 into a high order AP.
[0022] By the above procedure, a tree structure as shown in drawing 2 is formed as a channel between each AP of the wireless packet network of drawing 1 . It is drawing 3 (b) about the junction AP table on which each AP registered AP of a junction place (destination) based on the tree structure of drawing 2 . It is shown.
[0023] Drawing 4 shows an example of a packet format used by the study mold wireless packet transfer approach of this invention. Packet A is used for the transfer packet from STA to AP, and has the field of the transmitting agency address, a destination address, and the receiving

station address in a header unit at least. Packet B is used for the transfer packet between AP, and has the field of the transmitting agency address, a destination address, the sending-station address, and the receiving station address in a header unit at least. Packet C is used for the transfer packet from AP to STA, and has the field of the transmitting agency address and a destination address in a header unit at least.

[0024] Here, the MAC Address of the source AP to which, as for the transmitting agency address, the MAC Address of the destination STA of a packet and the sending-station address transmit the MAC Address of the transmitting agency STA of a packet, and a destination address transmits the packet concerned, and the receiving station address show the MAC Address of Destination AP which receives the packet concerned. Moreover, data division are distinguished by the identifier which shows a data packet, a hand off packet (H), a wireless connection packet (C), and a hand off directions packet (R), respectively. in addition, the hand off directions packet to which the wireless connection packet to which the hand off packet to which between AP is transmitted, for example is transmitted from BH and STA in explanation of each operation gestalt mentioned later to AP is transmitted from AC and AP to STA -- CR etc. -- it expresses.

[0025] Drawing 5 shows the flow of operation at the time of packet reception of the base transceiver station AP in the study mold wireless packet transfer approach of claim 1. AP receives either the packet A shown in drawing 4 , or the packet B, and transmits either Packet B or the packet C. If AP receives a wireless packet (S1), it judges whether the receiving station address is in agreement with a local station MAC Address (S2), and if it is not a thing addressed to a local station, a receive packet will be discarded (S3) and the thing addressed to a local station will identify the classification (Packet A and Packet B) of a receive packet (S4). In the case of Packet B, the transmitting agency address (the transmitting agency STA) and the sending-station address (source AP) are matched, and it registers with an address table (S5). In addition, in order to find AP to relay, in case an address table is referred to, it is transposed to the correspondence relation between Destination STA and Destination AP.

[0026] Next, it judges whether the transmitting origin STA shown in the transmitting agency address of Packet B is registered into the imputed table (S6), and if registered, the STA concerned will regard it as what moved to other AP subordinates and transmitted the packet from there, and will delete from an imputed table (S7).

[0027] When processing of the above [a receive packet] in the case of Packet A or Packet B is finished, it judges whether the destination STA shown with a destination address is registered into the imputed table (S8). When Destination STA is registered, Packet C is transmitted to the destination STA (S9).

[0028] In Destination STA not being registered into an imputed table, in order to find AP relayed to a degree, it judges whether Destination STA is registered into the address table (S10). When registered, the packet B which makes the destination AP corresponding to Destination STA the receiving station address based on an address table is transmitted (S11). If it judges whether there is AP in which junction is possible with reference to a junction AP table in addition to the source AP of the packet concerned in Destination STA not being registered into an address table (S12) and there is AP in which junction is possible in it, Packet B will be transmitted to all the AP (S13). Moreover, if there is no AP in which junction is possible, the receive packet will be discarded (S14).

[0029] Drawing 6 shows the example which transmits a wireless packet to STA5 from STA1. Here, STA1 and STA5 presuppose un-registering at the address table of each AP. Moreover, the imputed table and junction AP table of each AP are drawing 3 (a) and (b). It considers as a condition. Hereafter, it explains concretely, making the flow chart of drawing 5 correspond.

[0030] First, STA1 transmits a packet A-1 to AP1. The address field of this packet A-1 is AP1/STA5/STA1//.

[0031] Since AP1 which received this packet A-1 has not registered into an imputed table and an address table STA5 shown with a destination address, it transmits a packet B-1 to AP2, AP3, and AP4 in which junction is possible with reference to a junction AP table (S1, S2, S4, S8, S10, S12, S13). The address field of this packet B-1 is

AP2/AP1/STA5/STA1/AP3/AP1/STA5/STA1/AP4/AP1/STA5/STA1/.
[0032] AP3 and AP4 which received this packet B-1 match the source AP 1 shown in the transmitting agency STA 1 and the sending-station address which are shown in the transmitting agency address, and they register it into an address table (S5). Next, since STA5 shown with a destination address is not registered into an imputed table and an address table and AP in which junction is possible does not exist other than AP1, a receive packet B-1 is discarded (S6, S8, S10, S12, S14).
[0033] Similarly, AP2 which received the packet B-1 matches the source AP 1 the transmitting agency STA 1, and registers it into an address table (S5). Next, since STA5 shown with a destination address has not been registered into an imputed table and an address table, a packet B-2 is transmitted to AP5 in which junction is possible in addition to AP1 (S6, S8, S10, S12, S13). The address field of this packet B-2 is AP5/AP2/STA5/STA1/.
[0034] AP5 which received this packet B-2 matches the source AP 2 the transmitting agency STA 1, and registers it into an address table (S5). Next, since STA5 shown with a destination address is registered on an imputed table, a packet C-1 is transmitted to STA5 (8 S6, 9). The address field of this packet C-1 is STA5/STA1///. The condition of the address table of each AP after the packet transfer to STA5 shown above from STA1 is shown in drawing 7 .
[0035] Drawing 8 shows the example which transmits a wireless packet to STA1 from clinch STA5. The address table of each AP is taken as the condition of drawing 7 . The address field of the packet A-2 which STA5 transmits is AP5/STA1/STA5//.
[0036] Although AP5 which received this packet A-2 has not registered into an imputed table STA1 shown with a destination address, since it is registered (refer to drawing 7), it transmits a packet B-3 to an address table to the destination AP 2 corresponding to the destination STA 1 (S1, S2, S4, S8, S10, S11). The address field of this packet B-3 is AP2/AP5/STA1/STA5/.
[0037] AP2 which received this packet B-3 matches the source AP 5 the transmitting agency STA 5, and registers it into an address table (S5). Next, although STA1 shown with a destination address has not been registered into an imputed table, since it is registered to an address table, a packet B-4 is transmitted to the corresponding destination AP 1 (S6, S8, S10, S11). The address field of this packet B-4 is AP1/AP2/STA1/STA5/.
[0038] AP1 which received this packet B-4 matches the source AP 2 the transmitting agency STA 5, and registers it into an address table (S5). Next, since STA1 shown with a destination address is registered on an imputed table, a packet C-2 is transmitted to STA1 (8 S6, 9). The address field of this packet C-2 is STA1/STA5///. The condition of the address table of each AP after the packet transfer to STA1 shown above from STA5 is shown in drawing 9 . In addition, additional registration of the part of hatching is carried out in the packet transfer process from STA5 to STA1.
[0039] Drawing 10 shows the example which transmits a wireless packet to STA5 from STA1 again. The address table of each AP is taken as the condition of drawing 9 . The address field of the packet A-3 which STA1 transmits is AP1/STA5/STA1//.
[0040] Although AP1 which received this packet A-3 has not registered into an imputed table STA5 shown with a destination address, since it is registered (refer to drawing 9), it transmits a packet B-5 to an address table to corresponding AP2 (S1, S2, S4, S8, S10, S11). The address field of this packet B-5 is AP2/AP1/STA5/STA1/.
[0041] AP2 which received this packet B-5 matches the source AP 1 the transmitting agency STA 1, and updates an address table (S5). Next, although STA5 shown with a destination address has not been registered into an imputed table, since it is registered to an address table, a packet B-6 is transmitted to corresponding AP5 (S6, S8, S10, S11). The address field of this packet B-6 is AP5/AP2/STA5/STA1/.
[0042] AP5 which received this packet B-6 matches the source AP 2 the transmitting agency STA 1, and updates an address table (S5). Next, since STA5 shown with a destination address is registered on an imputed table, a packet C-3 is transmitted to STA5 (8 S6, 9). The address field of this packet C-3 is STA5/STA1///. The condition of the address table of each AP after the packet transfer to STA5 shown above from STA1 is the same as drawing 9 .
[0043] Drawing 11 shows the flow of operation at the time of packet reception of the base

transceiver station AP in the study mold wireless packet transfer approach of claim 2. Drawing 11 (a) The shown flow of operation is inserted between S4 shown in drawing 5 , and S6. after the description of this flow of operation matches the transmitting agency address (the transmitting agency STA) and the sending-station address (source AP) and registers them into an address table, it starts (S5) and a registration hold timer -- making (S22) -- it is at the time. A registration hold timer corresponds to Registration STA by 1 to 1, and measures the continuation sheep time of delivery of the packet which makes registration STA the transmitting agency address.

[0044] For example, in the condition that the address table of each AP already shows drawing 9 , as shown in drawing 10 , when registered, the transmitting origin STA AP which received Packet B is first indicated to be in the transmitting agency address judges whether it registers with the address table (S21). And in being registered, it resets a registration hold timer (S23), and the transmitting former address (the transmitting agency STA) and the sending-station address (source AP) are matched, an address table is updated (S24), and the restart of the registration hold timer is carried out (S25). In the transmitting agency STA not being registered into an address table, registration processing is performed like the flow of drawing 5 of operation (S5), and a registration hold timer is started in it (S22).

[0045] moreover -- the time of fixed time amount reception of the packet which makes registration STA the transmitting agency address not being carried out, but a registration hold timer carrying out a time-out -- (S26) and drawing 11 (b) The transmitting agency address (the transmitting agency STA) and the sending-station address (source AP) which are matched are deleted from an address table so that it may be shown (S27). Thereby, the condition of an address table can always be held in the newest condition.

[0046] (Operation gestalt with which STA changes Attribution AP) Drawing 12 shows the wireless packet network with which the study mold wireless packet transfer approach of claim 3 is applied, and the address table of each AP. the thing of the operation gestalt which shows the tree structure between each AP to drawing 1 and 2 in drawing -- the same -- the imputed table and junction AP table of each AP -- drawing 3 (a) and (b) It is the same as what is shown.

[0047] However, each AP as well as STA shall generate, transmit and receive a packet itself, and the correspondence relation of AP shall also be registered into an address table with the following operation gestalten (claim 7). That is, each AP sets a local station MAC Address as the transmitting agency address, sets the MAC Address of Destination AP as a destination address, transmits to it, and incorporates the packet whose destination address corresponds with a local station MAC Address among receive packets. And according to an above-mentioned registration procedure, the transmitting agency address (the transmitting agency AP) and the sending-station address (source AP) are likened with matching, Destination AP, and Destination AP, and it registers with an address table. For example, by relaying AP1 and AP2 from AP3 (AP4), and transmitting a wireless packet to AP5, AP4, AP1, and AP3 and AP1 are matched, respectively, and by AP5, AP3, AP2 and AP4, and AP2, AP1 and AP2 are matched, respectively, and they are registered into an address table at AP2. It is drawing 12 (b) about the condition of a final address table. It is shown.

[0048] Drawing 13 shows the wireless terminal STA in the study mold wireless packet transfer approach (at the time of a hand off) of claim 3, and the flow of a base transceiver station AP of operation. When STA moves to a contiguity cel, (S30) and STA belong to the migration place AP, the migration place AP registers STA which newly belongs into an imputed table, and the information about the STA is deleted from an address table (S31). And the hand off packet (shown in drawing 4) which STA made the destination the migration origin AP which belonged till then to the migration place AP, and made the local station the transmitting agency is transmitted (S32).

[0049] Furthermore, each AP on the channel from the migration place AP to the moved material AP carries out the sequential transfer of the hand off packet, matches the transmitting former address and the sending-station address, and registers or updates it to an address table (S33). The migration origin AP which a hand off packet finally reaches matches the transmitting agency address and the sending-station address of a hand off packet, registers them into an address

table, deletes the transmitting agency STA from an imputed table, and cancels attribution (S34).
[0050] Drawing 14 shows processing when STA5 moves to AP4 subordinate from AP5 subordinate in the wireless packet network of drawing 12 . In addition, the imputed table and junction AP table of each AP are drawing 3 (a) and (b). Considering as a condition, an address table is drawing 12 (b). It considers as a condition. Hereafter, it explains concretely, making the flow chart of drawing 13 correspond.
[0051] If STA5 belongs to AP4 after migration, AP4 will delete the relation between STA5 and AP1 registered into the address table, and it will register STA5 into an imputed table further (S31). And the destination transmits hand off packet AH-1 of the moved material AP 5 to AP4 (S32). In addition, AH A format of Packet A shows that data division are hand off packets. This address field of hand off packet AH-1 is AP4/AP5/STA5//.
[0052]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] Drawing showing the example of a configuration of the wireless packet network with which the study mold wireless packet transfer approach of claims 1 and 2 is applied.
[Drawing 2] Drawing showing the tree structure between AP in the wireless packet network of drawing 1 .
[Drawing 3] Drawing showing the imputed table and junction AP table in a wireless packet network of drawing 1 .
[Drawing 4] Drawing showing an example of a packet format used by this invention.
[Drawing 5] Drawing showing the flow of operation at the time of packet reception of the base transceiver station AP in the study mold wireless packet transfer approach of claim 1.
[Drawing 6] Drawing showing the example which transmits a wireless packet to STA5 from STA1.

[Drawing 7] Drawing showing the address table after the wireless packet transfer shown in drawing 6 .
[Drawing 8] Drawing showing the example which transmits a wireless packet to STA1 from clinch STA5.
[Drawing 9] Drawing showing the address table after the wireless packet transfer shown in drawing 8 .
[Drawing 10] Drawing showing the example which transmits a wireless packet to STA5 from STA1 again.
[Drawing 11] Drawing showing the flow of operation at the time of packet reception of the base transceiver station AP in the study mold wireless packet transfer approach of claim 2.
[Drawing 12] Drawing showing the wireless packet network with which the study mold wireless packet transfer approach of claim 3 is applied, and the address table of each AP.
[Drawing 13] Drawing showing the wireless terminal STA in the study mold wireless packet transfer approach (at the time of a hand off) of claim 3, and the flow of a base transceiver station AP of operation.
[Drawing 14] Drawing showing processing when STA5 moves to AP4 subordinate from AP5 subordinate.
[Drawing 15] Drawing showing the address table and imputed table after the hand off packet transfer shown in drawing 14 .
[Drawing 16] Drawing showing the example which transmits a wireless packet to STA5 from STA1.
[Drawing 17] Drawing showing the example of a configuration of the wireless packet network with which the study mold wireless packet transfer approach of claim 4 is applied.
[Drawing 18] Drawing showing a learning bridge and the study table of AP1.
[Drawing 19] Drawing showing the flow of the wireless terminal STA and a base transceiver station AP of operation in the study mold wireless packet transfer approach of claim 4.
[Drawing 20] Drawing showing processing when STA5 changes to cable connection.
[Drawing 21] Drawing showing the study table after the hand off packet transfer shown in drawing 20 .

[Drawing 22] Drawing showing the address table and imputed table after the hand off packet transfer shown in drawing 20 .
[Drawing 23] Drawing showing the example which transmits a wireless packet to STA5 from STA1.
[Drawing 24] Drawing showing processing when STA5 moves to AP3 subordinate from cable connection.
[Drawing 25] Drawing showing the study table after the wireless connection packet transfer shown in drawing 24 .
[Drawing 26] Drawing showing the address table and imputed table after the wireless connection packet transfer shown in drawing 24 .
[Drawing 27] Drawing showing the example which transmits a wireless packet to STA5 from STA1.
[Drawing 28] Drawing showing the wireless packet network with which the study mold wireless packet transfer approach of claims 5 and 6 is applied, and the address table of each AP.
[Drawing 29] Drawing showing the imputed table and junction AP table in a wireless packet network of drawing 28 .
[Drawing 30] Drawing showing the tree structure between AP before and behind a change.
[Drawing 31] Drawing showing the flow of the wireless terminal STA and a base transceiver station AP of operation in the study mold wireless packet transfer approach (at the time of a channel change) of claim 5.
[Drawing 32] Drawing showing processing when AP5 changes a channel to AP4 from AP2.
[Drawing 33] Drawing showing the junction AP table after the hand off packet transfer shown in drawing 32 .
[Drawing 34] Drawing showing the address table after the hand off packet transfer shown in drawing 32 .
[Drawing 35] Drawing showing the example which transmits a wireless packet to STA6 from STA1.
[Drawing 36] Drawing showing the flow of the wireless terminal STA and a base transceiver station AP of operation in the study mold wireless packet transfer approach (at the time of a channel change) of claim 6.
[Drawing 37] Drawing showing processing when AP5 changes a channel to AP4 from AP2.
[Drawing 38] The block diagram showing the example of a configuration of the base transceiver station AP of claims 8, 10-13.
[Drawing 39] The block diagram showing the example of a configuration of the base transceiver station AP of claim 9.
[Drawing 40] The block diagram showing the example of a configuration of the base transceiver station AP corresponding to a cable of claim 11.
[Drawing 41] Drawing showing the network example using a learning bridge.
[Drawing 42] Drawing showing the network example using a source routing bridge.

[Description of Notations]
AP Base transceiver station
STA Wireless terminal
11 Wireless Interface
12 21 Receive-packet distinction section
13 22 Control section
14 Imputed Table
15 Address Table
16 Junction AP Table
17 24 Transmitting packet generation section
18 Registration Hold Timer
23 Study Table
25 Cable Interface

[Translation done.]

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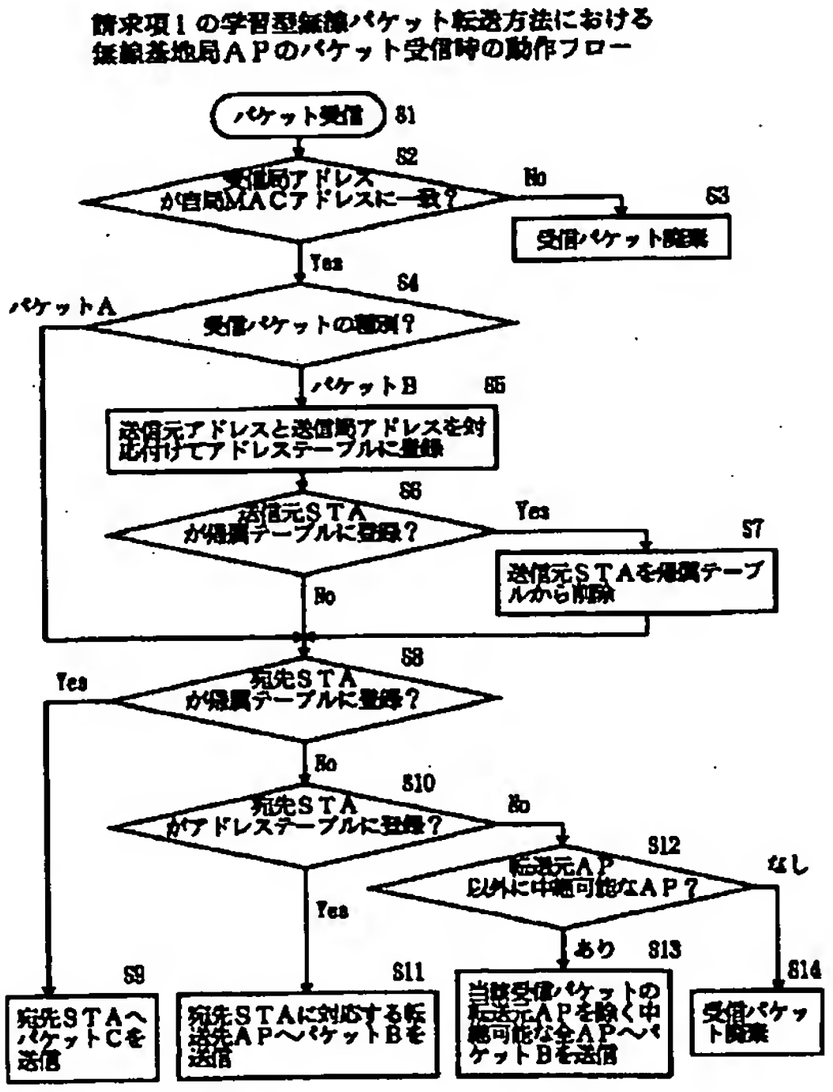
最終頁に続く

(54)【発明の名称】　学習型無線パケット転送方法および該方法を用いた無線基地局

(57)【要約】
【課題】　無線基地局の装置規模と消費電力の増加を伴わずにパケット転送を可能にし、無線基地局が次に転送する適当な無線基地局を容易に判断できる。
【解決手段】　無線基地局間を転送されるパケットＢを受信した無線基地局は、送信元アドレスで示される送信元無線端末と、送信局アドレスで示される転送元無線基地局とを対応付けてアドレステーブルに登録する。また、パケットＢの宛先アドレスで示される宛先無線端末について、アドレステーブルに登録の送信元アドレス（送信元無線端末）を検索し、対応する送信局アドレス（転送元無線基地局）を受信局アドレス（転送先無線基地局）とするパケットＢを生成する。また、宛先無線端末が全無線基地局のアドレステーブルに未登録の場合には、最初の送信パケットは全無線基地局へ転送し、登録済みの無線端末宛てのパケットは、送信元無線端末に関わらずアドレステーブルに基づいて転送先を決定する。

請求項１の学習型無線パケット転送方法における無線基地局ＡＰのパケット受信時の動作フロー



【特許請求の範囲】
【請求項１】　複数の無線基地局と１つ以上の無線端末とからなる無線パケット通信システムにおいて、
前記複数の無線基地局間で、その中の１つの特定無線基地局（ルート局）を起点としたツリー状の通信路を形成し、
前記ツリー状の通信路を介して前記無線基地局間で送受信するパケットＢは、ヘッダ部に送信元無線端末のＭＡＣアドレスを含む送信元アドレス、宛先無線端末のＭＡＣアドレスを含む宛先アドレス、当該パケットを送信する転送元無線基地局のＭＡＣアドレスを含む送信局アドレス、当該パケットを受信する転送先無線基地局のＭＡＣアドレスを含む受信局アドレスを有し、
前記複数の無線基地局は、それぞれ自局に帰属する無線端末を登録する帰属テーブルと、前記ツリー状の通信路に基づいて中継可能な無線基地局を登録する中継無線基地局テーブルと、宛先無線端末（宛先アドレス）と転送先無線基地局（受信局アドレス）を対応付けて登録するアドレステーブルとを有し、
前記各無線基地局は、前記パケットＢを受信したときに、
送信元アドレスで示される送信元無線端末と送信局アドレスで示される転送元無線基地局とを対応付け、宛先無線端末（宛先アドレス）と転送先無線基地局（受信局アドレス）に見立てて前記アドレステーブルに登録し、
宛先アドレスで示される宛先無線端末が前記帰属テーブルに登録されていれば、その宛先無線端末へパケットを送信し、
宛先アドレスで示される宛先無線端末が前記帰属テーブルに未登録で、かつ前記アドレステーブルに登録されていれば、その宛先無線端末に対応する転送先無線基地局へ前記パケットＢを送信し、
宛先アドレスで示される宛先無線端末が前記帰属テーブルおよび前記アドレステーブルに未登録で、かつ前記パケットＢを送信した転送元無線基地局以外に中継可能な無線基地局が前記中継無線基地局テーブルに登録されていれば、その中継可能な全無線基地局へ前記パケットＢを順次送信し、
宛先アドレスで示される宛先無線端末が前記帰属テーブルおよび前記アドレステーブルに未登録で、さらに前記パケットＢを送信した転送元無線基地局以外に中継可能な無線基地局が前記中継無線基地局テーブルに未登録であれば、前記パケットＢを廃棄することを特徴とする学習型無線パケット転送方法。
【請求項２】　請求項１に記載の学習型無線パケット転送方法において、
各無線基地局は、パケットＢを受信したときに、
送信元アドレスで示される送信元無線端末と送信局アドレスで示される転送元無線基地局とを対応付けてアドレステーブルに登録する際に、送信元無線端末に対応する登録保留タイマを開始し、
送信元アドレスで示される送信元無線端末がすでにアドレステーブルに登録されている場合には、前記登録保留タイマをリセットするとともに、送信元アドレスで示される送信元無線端末と送信局アドレスで示される転送元無線基地局とを対応付けてアドレステーブルを更新し、再度対応する登録保留タイマを開始し、
前記登録保留タイマがタイムアウトした場合には、対応する送信元無線端末（宛先無線端末）と転送元無線基地局（転送先無線基地局）のデータを前記アドレステーブルから削除することを特徴とする学習型無線パケット転送方法。
【請求項３】　請求項１に記載の学習型無線パケット転送方法において、
無線端末は、現在帰属している無線基地局（移動元無線基地局）から別の無線基地局（移動先無線基地局）の帰属に変更する場合に、移動先無線基地局に対して、移動元無線基地局を宛先とし、自局を送信元としたハンドオフパケットを送信し、
前記移動先無線基地局から前記移動元無線基地局に至る通信路上の各無線基地局は、前記ハンドオフパケットを順次転送し、その送信元アドレスと送信局アドレスを対応付けてアドレステーブルに登録または更新し、前記移動元無線基地局はさらに帰属テーブルから前記送信元無線端末を削除することを特徴とする学習型無線パケット転送方法。
【請求項４】　請求項１に記載の学習型無線パケット転送方法において、
無線パケット通信システムを構成する複数の無線基地局および１つ以上の無線端末の中に、有線パケット網に接続するための有線インタフェースを備える有線対応無線基地局および有線対応無線端末を有し、
前記有線対応無線基地局は、前記有線パケット網に接続され、他の無線基地局と接続するツリー状の通信路の起点となる特定無線基地局であり、
前記有線対応無線端末が現在帰属している無線基地局（移動元無線基地局）との無線接続から有線接続に接続替えを行った場合に、
前記有線対応無線端末は、前記有線パケット網に対して移動元無線基地局を宛先とし、自局を送信元としたハンドオフパケットを送信し、
前記有線パケット網は、受信した前記ハンドオフパケットを前記有線対応無線基地局へ転送し、
前記有線対応無線基地局から前記移動元無線基地局に至る通信路上の各無線基地局は、前記ハンドオフパケットを順次転送し、その送信元アドレスと送信局アドレスを対応付けてアドレステーブルに登録または更新し、前記移動元無線基地局はさらに帰属テーブルから送信元無線端末を削除する処理を行い、
前記有線対応無線端末が有線接続から無線基地局（移動

先無線基地局）との無線接続に接続替えを行った場合に、
前記有線対応無線端末は、移動先無線基地局に対して、自局を送信元とした無線接続パケットを送信し、
前記移動先無線基地局から前記有線対応無線基地局に至る通信路上の各無線基地局は、前記無線接続パケットを順次転送し、その送信元アドレスと送信局アドレスを対応付けてアドレステーブルに登録または更新し、
前記有線対応無線基地局は、前記無線接続パケットを有線インタフェースから前記有線パケット網へブロードキャスト送信する処理を行うことを特徴とする学習型無線パケット転送方法。

【請求項５】　請求項１に記載の学習型無線パケット転送方法において、
無線基地局が上位無線基地局（切替元無線基地局）との通信路を別の無線基地局（切替先無線基地局）に切り替えて切替先無線基地局に帰属した場合に、
前記無線基地局および前記切替先無線基地局は中継無線基地局テーブルを相互に更新し、前記無線基地局はアドレステーブルから前記切替元無線基地局の登録を削除し、
前記無線基地局は、アドレステーブルに登録中の無線端末の中から、前記切替元無線基地局以外の無線基地局に対応付けられている全無線端末、帰属テーブルに登録中の全無線端末、中継無線基地局テーブルに登録中の下位の全無線基地局を抽出し、さらに抽出した全無線端末、全無線基地局に対して、切替元無線基地局宛にハンドオフパケットを送信するように指示するハンドオフ指示パケットを順次送信し、
前記ハンドオフ指示パケットを受信した全無線端末および全無線基地局と、前記無線基地局は、前記切替元無線基地局を宛先とし、自局を送信元としたハンドオフパケットをそれぞれ送信し、
前記切替元無線基地局に至る通信路上の各無線基地局は、前記ハンドオフパケットを順次転送し、その送信元アドレスと送信局アドレスを対応付けてアドレステーブルに登録または更新し、さらに前記切替元無線基地局は前記中継無線基地局テーブルから前記無線基地局を削除することを特徴とする学習型無線パケット転送方法。

【請求項６】　請求項１に記載の学習型無線パケット転送方法において、
無線基地局が上位無線基地局（切替元無線基地局）との通信路を別の無線基地局（切替先無線基地局）に切り替えて切替先無線基地局に帰属した場合に、
前記無線基地局および前記切替先無線基地局は中継無線基地局テーブルを相互に更新し、前記無線基地局はアドレステーブルから前記切替元無線基地局の登録を削除し、
前記無線基地局は、アドレステーブルに登録中の無線端末の中から、前記切替元無線基地局以外の無線基地局に対応付けられている全無線端末、帰属テーブルに登録中の全無線端末、中継無線基地局テーブルに登録中の下位の全無線基地局を抽出し、さらに抽出した全無線端末、全無線基地局、および自局を送信元とし、前記切替元無線基地局を宛先としたハンドオフパケットをそれぞれ送信し、
前記切替元無線基地局に至る通信路上の各無線基地局は、前記ハンドオフパケットを順次転送し、その送信元アドレスと送信局アドレスを対応付けてアドレステーブルに登録または更新し、さらに切替元無線基地局は前記中継無線基地局テーブルから前記無線基地局を削除することを特徴とする学習型無線パケット転送方法。

【請求項７】　請求項１に記載の学習型無線パケット転送方法において、
無線基地局を送信元としたパケットＢを受信した無線基地局は、送信元アドレスで示される送信元無線基地局と送信局アドレスで示される転送元無線基地局とを対応付け、宛先無線基地局（宛先アドレス）と転送先無線基地局（受信局アドレス）に見立ててアドレステーブルに登録し、
請求項３～６に記載の各無線基地局を宛先とするハンドオフパケット、ハンドオフ指示パケット、無線接続パケットを転送する通信路上の無線基地局は、前記アドレステーブルに基づいてその宛先無線基地局に対応する転送先無線基地局へ前記各パケットを送信することを特徴とする学習型無線パケット転送方法。

【請求項８】　複数の無線基地局と１つ以上の無線端末とからなり、複数の無線基地局間で、その中の１つの特定無線基地局（ルート局）を起点としたツリー状の通信路を形成した無線パケット通信システムの無線基地局において、
自局に帰属する無線端末を登録する帰属テーブルと、前記ツリー状の通信路に基づいて中継可能な無線基地局を登録する中継無線基地局テーブルと、受信パケットの送信元アドレスと送信局アドレスを対応付けて登録するアドレステーブルとを有し、
パケットを受信したときにその種別を判別し、受信パケットが前記ツリー状の通信路を介して前記無線基地局間で送受信するパケットＢの場合に、請求項１に記載の学習型無線パケット転送方法に基づいてパケットの転送先無線基地局を決定し、各テーブルの登録および更新を行う制御手段を備えたことを特徴とする学習型無線パケット転送方法を用いた無線基地局。

【請求項９】　複数の無線基地局と１つ以上の無線端末とからなり、複数の無線基地局間で、その中の１つの特定無線基地局（ルート局）を起点としたツリー状の通信路を形成した無線パケット通信システムの無線基地局において、
自局に帰属する無線端末を登録する帰属テーブルと、前記ツリー状の通信路に基づいて中継可能な無線基地局を

登録する中継無線基地局テーブルと、受信パケットの送信元アドレスと送信局アドレスを対応付けて登録するアドレステーブルと、アドレステーブルに登録の送信元アドレスを有するパケットの連続未受信時間を計測する登録保留タイマを有し、
パケットを受信したときにその種別を判別し、受信パケットが前記ツリー状の通信路を介して前記無線基地局間で送受信するパケットＢの場合に、請求項２に記載の学習型無線パケット転送方法に基づいて同一送信元アドレスのパケットを管理し、アドレステーブルの情報を更新する制御手段を備えたことを特徴とする学習型無線パケット転送方法を用いた無線基地局。
【請求項１０】　複数の無線基地局と１つ以上の無線端末とからなり、複数の無線基地局間で、その中の１つの特定無線基地局（ルート局）を起点としたツリー状の通信路を形成した無線パケット通信システムの無線基地局において、
自局に帰属する無線端末を登録する帰属テーブルと、前記ツリー状の通信路に基づいて中継可能な無線基地局を登録する中継無線基地局テーブルと、受信パケットの送信元アドレスと送信局アドレスを対応付けて登録するアドレステーブルとを有し、
無線端末が現在帰属している無線基地局（移動元無線基地局）から別の無線基地局（移動先無線基地局）の帰属に変更する場合に、請求項３に記載の学習型無線パケット転送方法に基づいてハンドオフパケットを送受信し、各テーブルの情報を更新する制御手段を備えたことを特徴とする学習型無線パケット転送方法を用いた無線基地局。
【請求項１１】　複数の無線基地局と１つ以上の無線端末とからなり、さらにその中に有線パケット網に接続するための有線インタフェースを備える有線対応無線基地局および有線対応無線端末を有し、有線パケット網に接続される有線対応無線基地局を起点としたツリー状の通信路を形成した無線パケット通信システムの無線基地局において、
自局に帰属する無線端末を登録する帰属テーブルと、前記ツリー状の通信路に基づいて中継可能な無線基地局を登録する中継無線基地局テーブルと、受信パケットの送信元アドレスと送信局アドレスを対応付けて登録するアドレステーブルとを有し、
前記有線対応無線端末が現在帰属している無線基地局（移動元無線基地局）との無線接続から有線接続に接続替えを行った場合、あるいは前記有線対応無線端末が有線接続から無線基地局（移動先無線基地局）との無線接続に接続替えを行った場合に、請求項４に記載の学習型無線パケット転送方法に基づいてハンドオフパケットまたは無線接続パケットを送受信し、各テーブルの情報を更新する制御手段を備えたことを特徴とする学習型無線パケット転送方法を用いた無線基地局。
【請求項１２】　複数の無線基地局と１つ以上の無線端末とからなり、複数の無線基地局間で、その中の１つの特定無線基地局（ルート局）を起点としたツリー状の通信路を形成した無線パケット通信システムの無線基地局において、
自局に帰属する無線端末を登録する帰属テーブルと、前記ツリー状の通信路に基づいて中継可能な無線基地局を登録する中継無線基地局テーブルと、受信パケットの送信元アドレスと送信局アドレスを対応付けて登録するアドレステーブルとを有し、
前記無線基地局が上位無線基地局（切替元無線基地局）との通信路を別の無線基地局（切替先無線基地局）に切り替えて切替先無線基地局に帰属した場合に、請求項５に記載の学習型無線パケット転送方法に基づいてハンドオフ指示パケットおよびハンドオフパケットを送受信し、各テーブルの情報を更新する制御手段を備えたことを特徴とする学習型無線パケット転送方法を用いた無線基地局。
【請求項１３】　複数の無線基地局と１つ以上の無線端末とからなり、複数の無線基地局間で、その中の１つの特定無線基地局（ルート局）を起点としたツリー状の通信路を形成した無線パケット通信システムにおいて、
自局に帰属する無線端末を登録する帰属テーブルと、前記ツリー状の通信路に基づいて中継可能な無線基地局を登録する中継無線基地局テーブルと、受信パケットの送信元アドレスと送信局アドレスを対応付けて登録するアドレステーブルとを有し、
前記無線基地局が上位無線基地局（切替元無線基地局）との通信路を別の無線基地局（切替先無線基地局）に切り替えて切替先無線基地局に帰属した場合に、請求項６に記載の学習型無線パケット転送方法に基づいてハンドオフパケットを送受信し、各テーブルの情報を更新する制御手段を備えたことを特徴とする学習型無線パケット転送方法を用いた無線基地局。
【発明の詳細な説明】
【０００１】
【発明の属する技術分野】本発明は、無線パケット網のパケット転送方法に関する。特に、(1) 無線基地局間の無線パケット転送、(2) 有線対応無線端末が無線基地局を移動したとき、および有線接続と無線接続を切り替えたときの無線パケット経路切り替え、(3)無線基地局が上位無線基地局を切り替えたときのパケット転送経路切り替えに用いる学習型無線パケット転送方法に関する。さらに、この方法を用いた無線基地局の構成に関する。
【０００２】
【従来の技術】有線のネットワークでは、ラーニングブリッジ（トランスペアレントブリッジ）によるパケット転送方法、ソースルーティングブリッジによるパケット転送方法などがある。
【０００３】図４１は、ラーニングブリッジを用いたネ

ットワーク例を示す（従来技術１）。ラーニングブリッジはインタフェース＃１，＃２，＃３を有し、各インタフェースにそれぞれ端末ＰＣ１，ＰＣ２，ＰＣ３が接続される。ラーニングブリッジがパケットを受信すると、送信元端末のＭＡＣアドレスとパケットを受信したインタフェースを対応付けて学習テーブルに記憶する。ここでは、ＰＣ１と＃１、ＰＣ２と＃２、ＰＣ３と＃３が対応付けられる。

【０００４】宛先端末が学習テーブルに登録され、かつ対応付けられているインタフェースがパケットを受信したインタフェースでない場合は、宛先端末に対応付けられているインタフェースからパケットを送信する。宛先端末が学習テーブルに登録され、かつ対応付けられているインタフェースがパケットを受信したインタフェースの場合は、パケットを廃棄する。宛先端末が学習テーブルに登録されていない場合は、パケットを受信したインタフェース以外のすべてのインタフェースからパケットを送信する。

【０００５】図４２は、ソースルーティングブリッジを用いたネットワーク例を示す（従来技術２）。ソースルーティングブリッジＢ１，Ｂ２は、それぞれインタフェース＃１，＃２を有し、ソースルーティングブリッジＢ１のインタフェース＃２とソースルーティングブリッジＢ２のインタフェース＃１が接続される。また、ソースルーティングブリッジＢ１の各インタフェースにそれぞれ端末ＰＣ１，ＰＣ２が接続され、ソースルーティングブリッジＢ２の各インタフェースにそれぞれ端末ＰＣ１，ＰＣ３が接続される。

【０００６】ソースルーティングブリッジＢ１，Ｂ２は、パケットを受信すると、パケットのヘッダ部に指示されたルーティング情報に基づき、次の転送先ソースルーティングブリッジを選択してパケットを転送する。送信端末は、データパケットを送信するときに、まず宛先端末のＭＡＣアドレスを含む探索フレームをブロードキャストする。この探索フレームを受信した宛先端末は、その送信端末のＭＡＣアドレスを付与した全経路探索フレームをブロードキャストする。この全経路探索フレームを受信したソースルーティングブリッジは自局の識別子を書き込み、他のソースルーティングブリッジへ転送する。

【０００７】送信端末は、受信した複数の全経路探索フレームの中から、例えば書き込まれたソースルーティングブリッジの識別子数が最も少ない全経路探索フレームを選択し、経路情報テーブルに記憶する。例えば、図４２(b) に示すように、端末ＰＣ１の経路情報テーブルには、端末ＰＣ３への経路情報として、「Ｂ１，＃２，Ｂ２，＃２」が登録され、端末ＰＣ２への経路情報として、「Ｂ１，＃２」が登録される。送信端末は、データパケットのヘッダ部にルーティング情報として、図４２(c) に示すように、選択した全経路探索フレームに書き込まれたソースルーティングブリッジの識別子の順列をコピーして送信する。

【０００８】

【発明が解決しようとする課題】図４１，４２に示す従来技術１，２は、いずれも有線のネットワークによるものであり、これを無線基地局と無線端末から構成される無線パケット網のパケット転送に適用すると、次のような問題が生ずる。

【０００９】図４１に示す従来技術１では、ラーニングブリッジは複数のインタフェースをもち、パケット受信時に送信端末と当該パケットを受信したインタフェースを対応付けて学習テーブルに登録する。無線基地局がラーニングブリッジと同様の機能をもつためには、まず複数のインタフェースをもつ必要がある。しかし、無線基地局のインタフェースを構成するアンテナと変復調回路は、ラーニングブリッジのインタフェースに比べて複雑であり、無線基地局の装置規模が大きくなる問題がある。また、複数のアンテナと変復調回路をもつと消費電力が増加するため、無線基地局が電池駆動の場合には利用可能時間が制限されることになる。

【００１０】図４２に示す従来技術２を無線パケット網に適用すると、パケットを送信する全無線端末は、ルーティング情報を得るために探索フレームをブロードキャスト送信し、宛先無線端末は全経路探索フレームをブロードキャスト送信する必要がある。すなわち、最初のパケット送信や送信元無線端末が変わるごとに、探索フレームと全経路探索フレームの２度のブロードキャスト送信が必要になる。しかし、一般に有線ネットワークに比べて伝送容量が少ない無線ネットワークでは、探索フレームと全経路探索フレームの２度のブロードキャスト送信によるスループット低下の影響が大きくなる問題がある。

【００１１】本発明は、無線基地局と無線端末から構成される無線パケット通信システムにおいて、無線基地局の装置規模と消費電力の増加を伴わずにパケット転送を可能にする学習型無線パケット転送方法および該方法を用いた無線基地局を提供することを目的とする。

【００１２】また、本発明は、無線基地局と無線端末から構成される無線パケット通信システムにおいて、無線基地局が次に転送する適当な無線基地局を判断する際に、探索フレームや全経路探索フレームのブロードキャスト送信を不要とし、無線周波数資源の有効利用を可能にする学習型無線パケット転送方法および該方法を用いた無線基地局を提供することを目的とする。

【００１３】

【課題を解決するための手段】請求項１の学習型無線パケット転送方法および該方法を用いた無線基地局は、無線基地局間を転送されるパケットＢが、送信元アドレスと送信局アドレスをもつことを利用する。すなわち、パケットＢを受信した無線基地局は、送信元アドレスで示

される送信元無線端末／無線基地局と、送信局アドレスで示される転送元無線基地局とを対応付けてアドレステーブルに登録する。また、パケットＢの宛先アドレスで示される宛先無線端末／無線基地局について、アドレステーブルに登録の送信元アドレス（送信元無線端末／無線基地局）を検索し、対応する送信局アドレス（転送元無線基地局）を受信局アドレス（転送先無線基地局）とするパケットＢを生成する。これにより、宛先無線端末／無線基地局に対応する転送先無線基地局がわかり、速やかに転送処理を行うことができる。

【００１４】なお、宛先無線端末が全無線基地局のアドレステーブルに未登録の場合には、最初の送信パケットは全無線基地局へ転送されるが、登録済みの無線端末宛てのパケットは、送信元無線端末に関わらずアドレステーブルに基づいて転送先が決定される。また、その都度アドレステーブルの更新も行われる。したがって、最初のパケット送信や送信元無線端末が変わるごとに、探索フレームと全経路探索フレームの２度のブロードキャスト送信を必要とする従来技術に比べて、スループットを向上させることができる。

【００１５】無線端末が他の無線基地局のセルに移動したとき、有線対応無線端末が無線接続から有線接続に切り替えたときは、各無線端末は当初帰属していた移動元無線基地局宛てに、自局を送信元としたハンドオフパケットを送信する（請求項３，４）。また、有線対応無線端末が有線接続から無線接続に切り替えたときは、局自局を送信元とした無線接続パケットを送信し、各無線基地局は有線対応無線基地局まで無線接続パケットを転送し、有線対応無線基地局が有線ネットワークにブロードキャスト送信する（請求項４）。このハンドオフパケットや無線接続パケットの転送により、各無線基地局のアドレステーブルの情報を更新し、各状況変更があってもパケットの転送経路をアドレステーブルに基づいて速やかに決定することができる。

【００１６】無線基地局が上位無線基地局（切替元無線基地局）との通信路を別の無線基地局（切替先無線基地局）に切り替え、切替先無線基地局に帰属したときは、自局のアドレステーブルに登録中の無線端末の中から、切替元無線基地局以外の無線基地局に対応付けられている全無線端末、帰属テーブルに登録中の全無線端末、中継無線基地局テーブルに登録中の下位の全無線基地局を抽出し、その全無線端末、全無線基地局に対して、切替元無線基地局宛にハンドオフパケットを送信するように指示する（請求項５）。また、帰属変更を行う無線基地局は、上記により抽出された全無線端末、全無線基地局に代わり、それらを送信元とし、切替元無線基地局宛にハンドオフパケットを代理送信する（請求項６）。

【００１７】このようなハンドオフパケットを切替元無線基地局まで転送することにより、各無線基地局のアドレステーブルの情報を更新し、各状況変更があってもパケットの転送経路をアドレステーブルに基づいて速やかに決定することができる。

【００１８】

【発明の実施の形態】（基本の実施形態）図１は、請求項１，２の学習型無線パケット転送方法が適用される無線パケット網の構成例を示す。

【００１９】図において、ＡＰは無線基地局、ＳＴＡは無線端末を示す。無線基地局ＡＰ１～ＡＰ５は、それぞれ自局ＭＡＣアドレスを付与したビーコン信号を周期的に送信し、その信号が届く範囲をセル（破線で示す）という。無線端末ＳＴＡは、ビーコン信号を受信すると、その送信元ＡＰへＳＴＡ帰属信号を送信する。ＳＴＡ帰属信号を受信したＡＰは、その送信元ＳＴＡが自局セル内に存在すると判断し、帰属テーブルに登録する。図１の例では、ＳＴＡ１がＡＰ１に帰属し、ＳＴＡ５がＡＰ５に帰属する。ＡＰは、信頼性向上のために帰属完了をＳＴＡへ通知してもよい。ここで、各ＡＰが自局セル内に存在するＳＴＡを登録した帰属テーブルを図３(a)に示す。

【００２０】また、ＡＰ間の中継路をあらかじめループが発生しないように設定する。この中継路の設定には、上記のビーコン信号を利用する。無線パケット網管理者は、ルート（root）となる特定ＡＰを１つ選択する。図１の例ではＡＰ１である。まず、ＡＰ１がビーコン信号を周期的に送信する。ビーコン信号を受信したＡＰが送信元ＡＰ１へＡＰ帰属信号を送信する。図１の例では、ＡＰ２，ＡＰ３，ＡＰ４がＡＰ１のビーコン信号を受信し、ＡＰ１へＡＰ帰属信号を送信する。ＡＰ帰属信号を受信したＡＰ１は、ＡＰ２～ＡＰ４を中継可能なＡＰと判断し、中継ＡＰテーブルに登録する。また、ＡＰ２～ＡＰ４は、ＡＰ１を上位ＡＰとして中継ＡＰテーブルに登録する。ＡＰ１は、信頼性向上のために帰属完了をＡＰ２～ＡＰ４へ通知してもよい。

【００２１】続いて、ＡＰ２～ＡＰ４は、それぞれ同様にビーコン信号の送信を開始する。このとき、上位ＡＰは下位ＡＰからのビーコン信号を無視する。また、共通の上位ＡＰを登録しているＡＰは、相互のビーコン信号を無視する。図１の例では、ＡＰ５がＡＰ２とＡＰ４の双方からのビーコン信号を受信する。ＡＰ５は、ビーコン信号の送信元ＡＰの中から１つを選択し、ＡＰ帰属信号を送信する。その選択方法としては、ビーコン信号の受信電界強度が最大のＡＰを選択する、あるいはビーコン信号の受信誤り率が最小のＡＰを選択する、あるいはビーコン信号内にＡＰのトラヒック量を示すフィールドを設けそのトラヒック量が最小のＡＰを選択する等の方法がある。図１の例では、ＡＰ５は、ＡＰ２を選択してＡＰ帰属信号を送信する。ＡＰ帰属信号を受信したＡＰ２は、ＡＰ１に加えてＡＰ５を中継ＡＰテーブルに登録する。また、ＡＰ５は、ＡＰ２を上位ＡＰとして中継ＡＰテーブルに登録する。

【００２２】以上の手順により、図１の無線パケット網の各ＡＰ間の通信路として、図２に示すようなツリー構造が形成される。各ＡＰが図２のツリー構造に基づいて中継先（転送先）のＡＰを登録した中継ＡＰテーブルを図３(b) に示す。

【００２３】図４は、本発明の学習型無線パケット転送方法で用いるパケットフォーマットの一例を示す。パケットＡは、ＳＴＡからＡＰへの転送パケットに用いられ、ヘッダ部に少なくとも送信元アドレス、宛先アドレス、受信局アドレスのフィールドをもつ。パケットＢは、ＡＰ間の転送パケットに用いられ、ヘッダ部に少なくとも送信元アドレス、宛先アドレス、送信局アドレス、受信局アドレスのフィールドをもつ。パケットＣは、ＡＰからＳＴＡへの転送パケットに用いられ、ヘッダ部に少なくとも送信元アドレス、宛先アドレスのフィールドをもつ。

【００２４】ここで、送信元アドレスはパケットの送信元ＳＴＡのＭＡＣアドレス、宛先アドレスはパケットの宛先ＳＴＡのＭＡＣアドレス、送信局アドレスは当該パケットを送信する転送元ＡＰのＭＡＣアドレス、受信局アドレスは当該パケットを受信する転送先ＡＰのＭＡＣアドレスを示す。また、データ部は、データパケット、ハンドオフパケット（Ｈ）、無線接続パケット（Ｃ）、ハンドオフ指示パケット（Ｒ）をそれぞれ示す識別子により区別される。なお、後述する各実施形態の説明では、例えばＡＰ間を転送されるハンドオフパケットをB_H、ＳＴＡからＡＰへ転送される無線接続パケットをA_C、ＡＰからＳＴＡへ転送されるハンドオフ指示パケットをC_R 等で表す。

【００２５】図５は、請求項１の学習型無線パケット転送方法における無線基地局ＡＰのパケット受信時の動作フローを示す。ＡＰは、図４に示すパケットＡまたはパケットＢのいずれかを受信し、パケットＢまたはパケットＣのいずれかを送信する。ＡＰが無線パケットを受信すると（Ｓ１）、その受信局アドレスが自局ＭＡＣアドレスに一致しているか否かを判断し（Ｓ２）、自局宛てのものでなければ受信パケットを廃棄し（Ｓ３）、自局宛てのものは受信パケットの種別（パケットＡかパケットＢ）を識別する（Ｓ４）。パケットＢの場合には、送信元アドレス（送信元ＳＴＡ）と送信局アドレス（転送元ＡＰ）とを対応付けてアドレステーブルに登録する（Ｓ５）。なお、中継するＡＰを見つけるためにアドレステーブルを参照する際には、宛先ＳＴＡと転送先ＡＰの対応関係に置き換えられる。

【００２６】次に、パケットＢの送信元アドレスで示される送信元ＳＴＡが帰属テーブルに登録されているか否かを判断し（Ｓ６）、登録されていれば、当該ＳＴＡが他のＡＰ配下に移動してそこからパケットを送信したものとみなし、帰属テーブルから削除する（Ｓ７）。

【００２７】受信パケットが、パケットＡの場合、またはパケットＢで上記の処理を終えた場合には、宛先アドレスで示される宛先ＳＴＡが帰属テーブルに登録されているか否かを判断する（Ｓ８）。宛先ＳＴＡが登録済みの場合は、その宛先ＳＴＡへパケットＣを送信する（Ｓ９）。

【００２８】宛先ＳＴＡが帰属テーブルに未登録の場合には、次に中継するＡＰを見つけるために、宛先ＳＴＡがアドレステーブルに登録されているか否かを判断する（Ｓ10）。登録済みの場合は、アドレステーブルに基づいて宛先ＳＴＡに対応する転送先ＡＰを受信局アドレスとするパケットＢを送信する（Ｓ11）。宛先ＳＴＡがアドレステーブルに未登録の場合には、中継ＡＰテーブルを参照して当該パケットの転送元ＡＰ以外に中継可能なＡＰがあるか否かを判断し（Ｓ12）、中継可能なＡＰがあればその全ＡＰへパケットＢを送信する（Ｓ13）。また、中継可能なＡＰがなければ、その受信パケットを廃棄する（Ｓ14）。

【００２９】図６は、ＳＴＡ１からＳＴＡ５へ無線パケットを転送する例を示す。ここでは、ＳＴＡ１とＳＴＡ５が各ＡＰのアドレステーブルに未登録とする。また、各ＡＰの帰属テーブルおよび中継ＡＰテーブルは、図３(a), (b) の状態とする。以下、図５のフローチャートに対応させながら具体的に説明する。

【００３０】まず、ＳＴＡ１はＡＰ１にパケットＡ－１を送信する。このパケットＡ－１のアドレスフィールドは、

ＡＰ１／ＳＴＡ５／ＳＴＡ１／／

である。

【００３１】このパケットＡ－１を受信したＡＰ１は、宛先アドレスで示されるＳＴＡ５が帰属テーブルおよびアドレステーブルに未登録であるので、中継ＡＰテーブルを参照して中継可能なＡＰ２，ＡＰ３，ＡＰ４へパケットＢ－１を送信する（Ｓ１，Ｓ２，Ｓ４，Ｓ８，Ｓ10，Ｓ12，Ｓ13）。このパケットＢ－１のアドレスフィールドは、

ＡＰ２／ＡＰ１／ＳＴＡ５／ＳＴＡ１／
ＡＰ３／ＡＰ１／ＳＴＡ５／ＳＴＡ１／
ＡＰ４／ＡＰ１／ＳＴＡ５／ＳＴＡ１／

である。

【００３２】このパケットＢ－１を受信したＡＰ３，ＡＰ４は、送信元アドレスで示される送信元ＳＴＡ１と送信局アドレスで示される転送元ＡＰ１とを対応付けてアドレステーブルに登録する（Ｓ５）。次に、宛先アドレスで示されるＳＴＡ５が帰属テーブルおよびアドレステーブルに未登録であり、またＡＰ１以外に中継可能なＡＰが存在しないので、受信パケットＢ－１を廃棄する（Ｓ６，Ｓ８，Ｓ10，Ｓ12，Ｓ14）。

【００３３】同様に、パケットＢ－１を受信したＡＰ２は、送信元ＳＴＡ１と転送元ＡＰ１とを対応付けてアドレステーブルに登録する（Ｓ５）。次に、宛先アドレス

で示されるＳＴＡ５が帰属テーブルおよびアドレステーブルに未登録であるので、ＡＰ１以外に中継可能なＡＰ５へパケットＢ－２を送信する（Ｓ６，Ｓ８，Ｓ10，Ｓ12，Ｓ13）。このパケットＢ－２のアドレスフィールドは、
ＡＰ５／ＡＰ２／ＳＴＡ５／ＳＴＡ１／
である。
【００３４】このパケットＢ－２を受信したＡＰ５は、送信元ＳＴＡ１と転送元ＡＰ２とを対応付けてアドレステーブルに登録する（Ｓ５）。次に、宛先アドレスで示されるＳＴＡ５が帰属テーブルに登録済みであるので、ＳＴＡ５へパケットＣ－１を送信する（Ｓ６，８，９）。このパケットＣ－１のアドレスフィールドは、
ＳＴＡ５／ＳＴＡ１／／／
である。以上示したＳＴＡ１からＳＴＡ５へのパケット転送後の各ＡＰのアドレステーブルの状態を図７に示す。
【００３５】図８は、折り返しＳＴＡ５からＳＴＡ１へ無線パケットを転送する例を示す。各ＡＰのアドレステーブルは図７の状態とする。ＳＴＡ５が送信するパケットＡ－２のアドレスフィールドは、
ＡＰ５／ＳＴＡ１／ＳＴＡ５／／
である。
【００３６】このパケットＡ－２を受信したＡＰ５は、宛先アドレスで示されるＳＴＡ１が帰属テーブルに未登録であるが、アドレステーブルに登録済み（図７参照）であるので、宛先ＳＴＡ１に対応する転送先ＡＰ２へパケットＢ－３を送信する（Ｓ１，Ｓ２，Ｓ４，Ｓ８，Ｓ10，Ｓ11）。このパケットＢ－３のアドレスフィールドは、
ＡＰ２／ＡＰ５／ＳＴＡ１／ＳＴＡ５／
である。
【００３７】このパケットＢ－３を受信したＡＰ２は、送信元ＳＴＡ５と転送元ＡＰ５とを対応付けてアドレステーブルに登録する（Ｓ５）。次に、宛先アドレスで示されるＳＴＡ１が帰属テーブルに未登録であるが、アドレステーブルに登録済みであるので、対応する転送先ＡＰ１へパケットＢ－４を送信する（Ｓ６，Ｓ８，Ｓ10，Ｓ11）。このパケットＢ－４のアドレスフィールドは、
ＡＰ１／ＡＰ２／ＳＴＡ１／ＳＴＡ５／
である。
【００３８】このパケットＢ－４を受信したＡＰ１は、送信元ＳＴＡ５と転送元ＡＰ２とを対応付けてアドレステーブルに登録する（Ｓ５）。次に、宛先アドレスで示されるＳＴＡ１が帰属テーブルに登録済みであるので、ＳＴＡ１へパケットＣ－２を送信する（Ｓ６，８，９）。このパケットＣ－２のアドレスフィールドは、
ＳＴＡ１／ＳＴＡ５／／／
である。以上示したＳＴＡ５からＳＴＡ１へのパケット転送後の各ＡＰのアドレステーブルの状態を図９に示す。なお、ハッチングの箇所は、ＳＴＡ５からＳＴＡ１へのパケット転送過程で追加登録されたものである。
【００３９】図１０は、再度ＳＴＡ１からＳＴＡ５へ無線パケットを転送する例を示す。各ＡＰのアドレステーブルは図９の状態とする。ＳＴＡ１が送信するパケットＡ－３のアドレスフィールドは、
ＡＰ１／ＳＴＡ５／ＳＴＡ１／／
である。
【００４０】このパケットＡ－３を受信したＡＰ１は、宛先アドレスで示されるＳＴＡ５が帰属テーブルに未登録であるが、アドレステーブルに登録済み（図９参照）であるので、対応するＡＰ２へパケットＢ－５を送信する（Ｓ１，Ｓ２，Ｓ４，Ｓ８，Ｓ10，Ｓ11）。このパケットＢ－５のアドレスフィールドは、
ＡＰ２／ＡＰ１／ＳＴＡ５／ＳＴＡ１／
である。
【００４１】このパケットＢ－５を受信したＡＰ２は、送信元ＳＴＡ１と転送元ＡＰ１とを対応付けてアドレステーブルを更新する（Ｓ５）。次に、宛先アドレスで示されるＳＴＡ５が帰属テーブルに未登録であるが、アドレステーブルに登録済みであるので、対応するＡＰ５へパケットＢ－６を送信する（Ｓ６，Ｓ８，Ｓ10，Ｓ11）。このパケットＢ－６のアドレスフィールドは、
ＡＰ５／ＡＰ２／ＳＴＡ５／ＳＴＡ１／
である。
【００４２】このパケットＢ－６を受信したＡＰ５は、送信元ＳＴＡ１と転送元ＡＰ２とを対応付けてアドレステーブルを更新する（Ｓ５）。次に、宛先アドレスで示されるＳＴＡ５が帰属テーブルに登録済みであるので、ＳＴＡ５へパケットＣ－３を送信する（Ｓ６，８，９）。このパケットＣ－３のアドレスフィールドは、
ＳＴＡ５／ＳＴＡ１／／／
である。以上示したＳＴＡ１からＳＴＡ５へのパケット転送後の各ＡＰのアドレステーブルの状態は図９と同じである。
【００４３】図１１は、請求項２の学習型無線パケット転送方法における無線基地局ＡＰのパケット受信時の動作フローを示す。図１１(a)に示す動作フローは、図５に示すＳ４とＳ６との間に挿入されるものである。本動作フローの特徴は、送信元アドレス（送信元ＳＴＡ）と送信局アドレス（転送元ＡＰ）を対応付けてアドレステーブルに登録した後に（Ｓ５）、登録保留タイマをスタートさせる（Ｓ22）ところにある。登録保留タイマは、登録ＳＴＡに１対１で対応し、登録ＳＴＡを送信元アドレスとするパケットの連続未受信時間を計測する。
【００４４】例えば、図１０に示すように、各ＡＰのアドレステーブルがすでに図９に示す状態で登録済みのときに、パケットＢを受信したＡＰは、まず送信元アドレスで示される送信元ＳＴＡがアドレステーブルに登録されているか否かを判断する（Ｓ21）。そして、登録済み

の場合には登録保留タイマをリセットし（S23）、その送信元アドレス（送信元ＳＴＡ）と送信局アドレス（転送元ＡＰ）とを対応付けてアドレステーブルを更新し（S24）、登録保留タイマを再スタートさせる（S25）。送信元ＳＴＡがアドレステーブルに未登録の場合には、図５の動作フローと同様に登録処理を行い（Ｓ５）、登録保留タイマをスタートさせる（S22）。

【００４５】また、登録ＳＴＡを送信元アドレスとするパケットが一定時間受信されず、登録保留タイマがタイムアウトしたときには（S26）、図１１(b) に示すようにアドレステーブルから、対応付けられている送信元アドレス（送信元ＳＴＡ）と送信局アドレス（転送元ＡＰ）を削除する（S27）。これにより、アドレステーブルの状態を常に最新状態に保持することができる。

【００４６】（ＳＴＡが帰属ＡＰを変更する実施形態）図１２は、請求項３の学習型無線パケット転送方法が適用される無線パケット網および各ＡＰのアドレステーブルを示す。図において、各ＡＰ間のツリー構造は図１，２に示す実施形態のものと同様であり、各ＡＰの帰属テーブルおよび中継ＡＰテーブルは図３(a), (b) に示すものと同じである。

【００４７】ただし、以下の実施形態では、各ＡＰもＳＴＡと同様に自らパケットを生成して送受信し、ＡＰ同士の対応関係もアドレステーブルに登録されるものとする（請求項７）。すなわち、各ＡＰは、送信元アドレスに自局ＭＡＣアドレスを設定し、宛先アドレスに宛先ＡＰのＭＡＣアドレスを設定して送信し、受信パケットのうち宛先アドレスが自局ＭＡＣアドレスに一致するパケットを取り込む。そして、上述の登録手順に従い、送信元アドレス（送信元ＡＰ）と送信局アドレス（転送元ＡＰ）とを対応付け、宛先ＡＰと転送先ＡＰに見立ててアドレステーブルに登録する。例えば、ＡＰ３（ＡＰ４）からＡＰ１，ＡＰ２を中継してＡＰ５へ無線パケットを転送することにより、ＡＰ２ではＡＰ４とＡＰ１およびＡＰ３とＡＰ１がそれぞれ対応付けられ、ＡＰ５ではＡＰ３とＡＰ２、ＡＰ４とＡＰ２、ＡＰ１とＡＰ２がそれぞれ対応付けられてアドレステーブルに登録される。最終的なアドレステーブルの状態を図１２(b) に示す。

【００４８】図１３は、請求項３の学習型無線パケット転送方法（ハンドオフ時）における無線端末ＳＴＡおよび無線基地局ＡＰの動作フローを示す。ＳＴＡが隣接セルへ移動することにより（S30）、ＳＴＡは移動先ＡＰに帰属し、移動先ＡＰは新たに帰属するＳＴＡを帰属テーブルに登録し、アドレステーブルからそのＳＴＡに関する情報を削除する（S31）。そして、ＳＴＡは、移動先ＡＰに対して、それまで帰属していた移動元ＡＰを宛先とし、自局を送信元としたハンドオフパケット（図４に示す）を送信する（S32）。

【００４９】さらに、移動先ＡＰから移動元ＡＰに至る通信路上の各ＡＰは、ハンドオフパケットを順次転送し、その送信元アドレスと送信局アドレスを対応付けてアドレステーブルに登録または更新する（S33）。最後にハンドオフパケットが到着する移動元ＡＰは、ハンドオフパケットの送信元アドレスと送信局アドレスを対応付けてアドレステーブルに登録し、帰属テーブルから送信元ＳＴＡを削除して帰属を解除する（S34）。

【００５０】図１４は、図１２の無線パケット網において、ＳＴＡ５がＡＰ５配下からＡＰ４配下に移動した場合の処理を示す。なお、各ＡＰの帰属テーブルおよび中継ＡＰテーブルは、図３(a), (b) の状態とし、アドレステーブルは図１２(b) の状態とする。以下、図１３のフローチャートに対応させながら具体的に説明する。

【００５１】ＳＴＡ５は移動後にＡＰ４に帰属すると、ＡＰ４はアドレステーブルに登録されているＳＴＡ５とＡＰ１の関係を削除し、さらに帰属テーブルにＳＴＡ５を登録する（S31）。そして、宛先が移動元ＡＰ５のハンドオフパケットA_H －１をＡＰ４に送信する（S32）。なお、A_H は、パケットＡのフォーマットでデータ部がハンドオフパケットであることを示す。このハンドオフパケットA_H －１のアドレスフィールドは、

ＡＰ４／ＡＰ５／ＳＴＡ５／／

である。

【００５２】このハンドオフパケットA_H －１を受信したＡＰ４は、アドレステーブルに基づいて、宛先ＡＰ５に対応する転送先ＡＰ１へハンドオフパケットB_H －１を送信する（S33）。このハンドオフパケットB_H －１のアドレスフィールドは、

ＡＰ１／ＡＰ４／ＡＰ５／ＳＴＡ５／

である。

【００５３】このハンドオフパケットB_H －１を受信したＡＰ１は、送信元ＳＴＡ５と転送元ＡＰ４とを対応付けてアドレステーブルを更新する（S33）。次に、ＡＰ１のアドレステーブルに基づいて、宛先ＡＰ５に対応する転送先ＡＰ２へハンドオフパケットB_H －２を送信する。このハンドオフパケットB_H －２のアドレスフィールドは、

ＡＰ２／ＡＰ１／ＡＰ５／ＳＴＡ５／

である。

【００５４】このハンドオフパケットB_H －２を受信したＡＰ２は、送信元ＳＴＡ５と送信元ＡＰ１とを対応付けてアドレステーブルを更新する。次に、宛先アドレスで示されるＡＰ５がアドレステーブルに未登録であるので、中継ＡＰテーブル（図３(b)）に基づいてＡＰ５へハンドオフパケットB_H －３を送信する。このハンドオフパケットB_H －３のアドレスフィールドは、

ＡＰ５／ＡＰ２／ＡＰ５／ＳＴＡ５／

である。

【００５５】このハンドオフパケットB_H －３を受信したＡＰ５は、送信元ＳＴＡ５と転送元ＡＰ２とを対応付けてアドレステーブルに登録し、さらに帰属テーブルか

らＳＴＡ５を削除する（S34）。以上示したＳＴＡ５からＡＰ５へのハンドオフパケット転送後のアドレステーブルおよび帰属テーブルの状態を図１５(a),(b) に示す。なお、ハッチングの箇所は、ＳＴＡ５からＡＰ５へのパケット転送過程で登録、更新あるいは削除されたものである。

【００５６】図１６は、ＳＴＡ１からＳＴＡ５へ無線パケットを転送する例を示す。各ＡＰのアドレステーブルおよび帰属テーブルは図１５の状態とする。この転送動作は、図５のフローチャートに基づく。ＳＴＡ１が送信するパケットＡ－４のアドレスフィールドは、

ＡＰ１／ＳＴＡ５／ＳＴＡ１／／

である。

【００５７】このパケットＡ－４を受信したＡＰ１は、宛先アドレスで示されるＳＴＡ５が帰属テーブルに未登録であるが、アドレステーブルに登録済み（図１５参照）であるので、対応するＡＰ４へパケットＢ－７を送信する。このパケットＢ－７のアドレスフィールドは、

ＡＰ４／ＡＰ１／ＳＴＡ５／ＳＴＡ１／

である。

【００５８】このパケットＢ－７を受信したＡＰ４は、送信元ＳＴＡ１と転送元ＡＰ１とを対応付けてアドレステーブルを更新する。次に、帰属テーブルに基づいてＳＴＡ５へパケットＣ－４を送信する。このパケットＣ－４のアドレスフィールドは、

ＳＴＡ５／ＳＴＡ１／／／

である。以上示したＳＴＡ５からＳＴＡ１へのパケット転送後の各ＡＰのアドレステーブルの状態は図１５と同じである。

【００５９】（ＳＴＡが無線接続と有線接続を相互に切り替える実施形態）図１７は、請求項４の学習型無線パケット転送方法が適用される無線パケット網の構成例を示す。

【００６０】図において、各ＡＰ間のツリー構造は上述の無線パケット網と同じであり、各ＡＰの中継ＡＰテーブルは図３(b) のようになる。ここでは、ＳＴＡ１はＡＰ１に帰属し、ＳＴＡ５はＡＰ４に帰属する例を示し、各ＡＰのアドレステーブルおよび帰属テーブルは図１５のようになる。

【００６１】また、ＡＰ１は有線ＬＡＮに接続するための有線インタフェースを有する有線対応ＡＰ、ＡＰ２～ＡＰ５は通常のＡＰ、ＳＴＡ５は有線ＬＡＮに接続するための有線インタフェースを有する有線対応ＳＴＡ、ＳＴＡ１は通常のＳＴＡとする。ＡＰ１と有線ＬＡＮのラーニングブリッジのインタフェース＃２が接続される。なお、ＡＰ１にも、有線インタフェースと無線インタフェース間のパケット転送のためのラーニングブリッジの機能が備えられる。

【００６２】図１８は、ラーニングブリッジおよびＡＰ１の学習テーブルを示す。各学習テーブルには、上述のパケット転送に伴う登録手順により、全ＳＴＡと全ＡＰが登録されるものとする。すなわち、ラーニングブリッジの学習テーブルでは、全ＳＴＡおよび全ＡＰとインタフェース＃２が対応付けられる。また、ＡＰ１の学習テーブルでは、全ＳＴＡおよびＡＰ２～５と無線インタフェースが対応付けられる。

【００６３】図１９は、請求項４の学習型無線パケット転送方法における無線端末ＳＴＡと無線基地局ＡＰの動作フローを示す。(a) は有線対応ＳＴＡが無線接続から有線接続に接続替えを行った場合を示す。(b) は有線対応ＳＴＡが有線接続から無線接続に接続替えを行った場合を示す。

【００６４】図１９(a) において、有線対応ＳＴＡが現在帰属しているＡＰ（移動元ＡＰ）との無線接続から有線接続に接続替えを行うと（S40）、有線対応ＳＴＡが有線パケット網に対して移動元ＡＰを宛先とし、自局を送信元としたハンドオフパケットを送信する（S41）。有線パケット網は、受信したハンドオフパケットをラーニングブリッジを介して有線対応ＡＰへ転送する（S42）。有線対応ＡＰがハンドオフパケットを受信すると、ツリー状の通信路に従って下位ＡＰへ転送する。有線対応ＡＰから移動元ＡＰに至る通信路上の各ＡＰは、ハンドオフパケットを順次転送し、その送信元アドレスと送信局アドレスを対応付けてアドレステーブルに登録または更新する（S43）。最後にハンドオフパケットが到着する移動元ＡＰは、ハンドオフパケットの送信元アドレスと送信局アドレスを対応付けてアドレステーブルに登録し、帰属テーブルから送信元ＳＴＡを削除する（S44）。

【００６５】図１９(b) において、有線対応ＳＴＡが有線接続からＡＰ（移動先ＡＰ）との無線接続に接続替えを行うと（S45）、有線対応ＳＴＡが移動先ＡＰに対して、自局を送信元とした無線接続パケットを送信する（S46）。移動先ＡＰは、この無線接続パケットを受信すると、ツリー状の通信路に従って上位ＡＰへ転送する。移動先ＡＰから有線対応ＡＰに至る通信路上の各ＡＰは、無線接続パケットを順次転送し、その送信元アドレスと送信局アドレスを対応付けてアドレステーブルに登録または更新する（S47）。有線対応ＡＰは、無線接続パケットを有線インタフェースから有線パケット網へブロードキャスト送信する（S48）。

【００６６】図２０は、図１７の無線パケット網において、ＳＴＡ５が有線接続へ切り替えた場合の処理を示す。以下、図１９(a) のフローチャートに対応させながら具体的に説明する。

【００６７】ＳＴＡ５は、現在帰属している移動元ＡＰ４から離れて有線ＬＡＮに接続されると（S40）、宛先がＡＰ４のハンドオフパケットD_H－１を有線ＬＡＮに送信する（S41）。なお、D_H は、有線ＬＡＮのパケットのうちハンドオフパケットであることを示す。

【００６８】このハンドオフパケットD_H －１を受信したラーニングブリッジは、図１８の学習テーブルに基づいてインタフェース＃２からハンドオフパケットD_H －２を送信し（S42）、ＳＴＡ５とインタフェース＃１を対応付けて学習テーブルを更新する。ＡＰ１はこのハンドオフパケットD_H －２を受信すると、ＳＴＡ５と有線インタフェースを対応付けて学習テーブルを更新し、図１５(a) のアドレステーブルからＳＴＡ５を削除する。さらに、ＡＰ１はハンドオフパケットD_H －２を無線パケットフォーマットのハンドオフパケットB_H －４に変換し、宛先のＡＰ４へ送信する（S43）。このハンドオフパケットB_H －４のアドレスフィールドは、
ＡＰ４／ＡＰ１／ＡＰ４／ＳＴＡ５／
である。
【００６９】このハンドオフパケットB_H －４を受信した移動元ＡＰ４は、送信元アドレスで示される送信元ＳＴＡ５と送信局アドレスで示される転送元ＡＰ１とを対応付けてアドレステーブルに登録し、さらに帰属テーブルからＳＴＡ５を削除する（S44）。
【００７０】以上示したＳＴＡ５からＡＰ４へのハンドオフパケット転送後の各学習テーブルの状態を図２１に示し、各ＡＰのアドレステーブルおよび帰属テーブルの状態を図２２(a), (b) に示す。なお、ハッチングの箇所は、ＳＴＡ５からＡＰ４へのハンドオフパケット転送過程で登録、更新あるいは削除されたものである。
【００７１】図２３は、ＳＴＡ１からＳＴＡ５へ無線パケットを転送する例を示す。ラーニングブリッジおよびＡＰ１の学習テーブルは図２１の状態とし、各ＡＰのアドレステーブルおよび帰属テーブルは図２２の状態とする。ＳＴＡ１が送信するパケットＡ－５のアドレスフィールドは、
ＡＰ１／ＳＴＡ５／ＳＴＡ１／／
である。
【００７２】このパケットＡ－５を受信したＡＰ１は、学習テーブルに基づいてＳＴＡ５宛てのパケットを有線ＬＡＮのパケットフォーマットに変換し、有線ＬＡＮに送信する。このパケットＤ－１を受信したラーニングブリッジは、学習テーブルに基づいてＳＴＡ５宛てのパケットＤ－２をインタフェース＃１から送信する。ＳＴＡ５は、このパケットＤ－２を有線ＬＡＮから受信する。
【００７３】図２４は、ＳＴＡ５が有線接続からＡＰ３配下に移動した場合の処理を示す。なお、各学習テーブルは図２１の状態とし、各ＡＰのアドレステーブルおよび帰属テーブルは図２２(a), (b) の状態とする。以下、図１９(b) のフローチャートに対応させながら具体的に説明する。
【００７４】ＳＴＡ５は移動後にＡＰ３に帰属し、無線接続パケットA_C －１をＡＰ３に送信する（S46）。なお、A_C は、パケットＡのフォーマットでデータ部が無線接続パケットであることを示す。
【００７５】この無線接続パケットA_C －１を受信したＡＰ３は、ＳＴＡ５が配下になったことによりアドレステーブルに登録されているＳＴＡ５とＡＰ１の関係を削除し、さらに帰属テーブルにＳＴＡ５を登録する。次に、転送先ＡＰ１へ無線接続パケットB_C －１を送信する（S47）。この無線接続パケットB_C －１を受信したＡＰ１は、学習テーブルに基づいて無線接続パケットを有線ＬＡＮのパケットフォーマットに変換し、有線ＬＡＮにブロードキャスト送信し、有線ＬＡＮ上のアドレステーブルを更新する（S48）。
【００７６】以上示したＳＴＡ５からラーニングブリッジへの無線接続パケット転送後の各学習テーブルの状態を図２５に示し、各ＡＰのアドレステーブルおよび帰属テーブルの状態を図２６(a), (b) に示す。なお、ハッチングの箇所は、ＳＴＡ５からラーニングブリッジへの無線接続パケット転送過程で登録、更新あるいは削除されたものである。
【００７７】図２７は、ＳＴＡ１からＳＴＡ５へ無線パケットを転送する例を示す。ラーニングブリッジおよびＡＰ１の学習テーブルは図２５の状態とし、各ＡＰのアドレステーブルおよび帰属テーブルは図２６の状態とする。ＳＴＡ１が送信するパケットＡ－６のアドレスフィールドは、
ＡＰ１／ＳＴＡ５／ＳＴＡ１／／
である。
【００７８】このパケットＡ－６を受信したＡＰ１は、宛先アドレスで示されるＳＴＡ５が帰属テーブルに未登録であるが、アドレステーブルに登録済みであるので、対応するＡＰ３へパケットＢ－８を送信する。このパケットＢ－８のアドレスフィールドは、
ＡＰ３／ＡＰ１／ＳＴＡ５／ＳＴＡ１／
である。
【００７９】このパケットＢ－８を受信したＡＰ３は、送信元ＳＴＡ１と転送元ＡＰ１とを対応付けてアドレステーブルを更新する。次に、宛先アドレスで示されるＳＴＡ５が帰属テーブルに登録済みであるので、ＳＴＡ５へパケットＣ－５を送信する。このパケットＣ－５のアドレスフィールドは、
ＳＴＡ５／ＳＴＡ１／／／
である。以上示したＳＴＡ５からＳＴＡ１へのパケット転送後の各ＡＰのアドレステーブルの状態は図２６と同じである。
【００８０】（ＡＰが通信路切り替えを行う実施形態）図２８は、請求項５，６の学習型無線パケット転送方法が適用される無線パケット網および各ＡＰのアドレステーブルを示す。
【００８１】図において、各ＡＰ間のツリー構造は、図１２の無線パケット網のＡＰ５にＡＰ６が接続され、ＡＰ６にＳＴＡ６が帰属するものとする。各ＡＰのアドレステーブルには、図２８(b) のように、パケット転送に

伴う登録手順により全ＳＴＡと全ＡＰが登録されているものとする。同様に、各ＡＰの帰属テーブルおよび中継ＡＰテーブルは図２９(a), (b) のようになる。

【００８２】ここで、ＡＰ２とＡＰ５との間に遮蔽物等が出現し、その間の通信路が遮断された場合を想定する。このとき、ＡＰ５が上位ＡＰとの通信路をＡＰ２からＡＰ４へ切り替える。この切り替え前後のＡＰ間のツリー構造を図３０に示す。

【００８３】図３１は、請求項５の学習型無線パケット転送方法（通信路切替時）における無線端末ＳＴＡと無線基地局ＡＰの動作フローを示す。図３２は、ＡＰ５がＡＰ２からＡＰ４へ通信路を切り替えた場合の処理を示す。なお、各ＡＰのアドレステーブルは図２８(b) 、各ＡＰの帰属テーブルおよび中継ＡＰテーブルは図２９(a), (b) の状態とする。以下、図３１のフローチャートに対応させながら具体的に説明する。

【００８４】ＡＰ５が切替元ＡＰ２との通信路を切替先ＡＰ４に切り替え、切替先ＡＰ４に帰属すると（Ｓ５０）、図２９(b) に示すＡＰ５の中継ＡＰテーブルに登録されている上位ＡＰ２を上位ＡＰ４に更新し、ＡＰ４の中継ＡＰテーブルに下位ＡＰ５を登録する（図３３参照）。また、図２８(b) に示すＡＰ５のアドレステーブルに登録されているＡＰ２関係を削除する（Ｓ51）。

【００８５】次に、ＡＰ５は、アドレステーブルに登録中のＳＴＡの中から切替元ＡＰ２以外のＡＰに対応付けられている全ＳＴＡ、帰属テーブルに登録中の全ＳＴＡ、中継ＡＰテーブルに登録中の下位の全ＡＰを抽出する（Ｓ52）。ここでは、ＳＴＡ６およびＡＰ６が抽出される。ＡＰ５は、抽出したＳＴＡ６およびＡＰ６に対して、切替元ＡＰ２宛にハンドオフパケットを送信するように指示するハンドオフ指示パケットB_R －１，２を順次送信する（Ｓ53）。なお、B_R は、図４に示すパケットＢのフォーマットでデータ部がハンドオフ指示パケットであることを示す。

【００８６】ＳＴＡ６宛てのハンドオフ指示パケットB_R －１を受信したＡＰ６は、さらにＳＴＡ６宛てのハンドオフ指示パケットC_R －１を送信する（Ｓ53）。なお、C_R は、図４に示すパケットＣのフォーマットでデータ部がハンドオフ指示パケットであることを示す。

【００８７】このハンドオフ指示パケットC_R －１を受信したＳＴＡ６は、切替元ＡＰ２を宛先とし、自局を送信元としたハンドオフパケットA_H －２を送信する（Ｓ54）。このハンドオフパケットA_H －２を受信したＡＰ６は、図１４に示すハンドオフパケットの転送処理と同様に、その宛先の切替元ＡＰ２までハンドオフパケットを転送する。

【００８８】すなわち、ＡＰ６は、アドレステーブルに基づいて宛先ＡＰ２の転送先ＡＰ５へハンドオフパケットB_H －５を送信する（Ｓ55）。このハンドオフパケットB_H －５のアドレスフィールドは、

ＡＰ５／ＡＰ６／ＡＰ２／ＳＴＡ６／

である。

【００８９】このハンドオフパケットB_H －５を受信したＡＰ５は、送信元ＳＴＡ６と転送元ＡＰ６とを対応付けてアドレステーブルを更新する（Ｓ55）。次に、宛先アドレスで示されるＡＰ２がアドレステーブルに未登録（ＡＰ２関係がすでに削除）であるので、図３３の中継ＡＰテーブルに基づいて上位のＡＰ２へハンドオフパケットB_H －６を送信する。このハンドオフパケットB_H －６のアドレスフィールドは、

ＡＰ４／ＡＰ５／ＡＰ２／ＳＴＡ６／

である。

【００９０】このハンドオフパケットB_H －６を受信したＡＰ４は、送信元ＳＴＡ６と送信元ＡＰ５とを対応付けてアドレステーブルを更新する。次に、アドレステーブルに基づいて宛先ＡＰ２の転送先ＡＰ１へハンドオフパケットB_H －７を送信する。このハンドオフパケットB_H －７のアドレスフィールドは、

ＡＰ１／ＡＰ４／ＡＰ２／ＳＴＡ６／

である。

【００９１】このハンドオフパケットB_H －７を受信したＡＰ１は、送信元ＳＴＡ６と転送元ＡＰ４とを対応付けてアドレステーブルを更新する。次に、中継ＡＰテーブルに基づいて下位のＡＰ２へハンドオフパケットB_H －８を送信する。このハンドオフパケットB_H －８のアドレスフィールドは、

ＡＰ２／ＡＰ１／ＡＰ２／ＳＴＡ６／

である。このハンドオフパケットB_H －８を受信したＡＰ２は、送信元ＳＴＡ６と転送元ＡＰ１とを対応付けてアドレステーブルを更新する（Ｓ56）。

【００９２】同様に、ハンドオフ指示パケットB_R －２を受信したＡＰ６およびＡＰ５自身は、それぞれ切替元ＡＰ２を宛先とし、自局を送信元としたハンドオフパケットを送信する（Ｓ54）。このハンドオフパケットは図３２に示すB_H －５～B_H －８と同様にＡＰ２まで転送され、送信元ＡＰ６，ＡＰ５と各転送先ＡＰとを対応付けて各ＡＰのアドレステーブルを更新する（Ｓ55，Ｓ56）。

【００９３】また、ＡＰ２は、ＡＰ１経由で送信元がＡＰ５のハンドオフパケットを受信することにより、ＡＰ５が他のＡＰ配下に移動したものとみなし、中継ＡＰテーブルからＡＰ５を削除する（Ｓ56）。

【００９４】以上示した各ハンドオフパケット転送後の各ＡＰの中継ＡＰテーブルおよびアドレステーブルの状態を図３３，３４に示す。なお、ハッチングの箇所は、各ハンドオフパケット転送過程で登録、更新あるいは削除されたものである。また、カッコ書きで示した箇所は、それ以降の無線パケットの転送過程で登録されるものである。

【００９５】図３５は、ＳＴＡ１からＳＴＡ５へ無線パ

ケットを転送する例を示す。各ＡＰの中継ＡＰテーブルおよびアドレステーブルは図３３，３４の状態とする。ＳＴＡ１が送信するパケットＡ－７のアドレスフィールドは、
ＡＰ１／ＳＴＡ６／ＳＴＡ１／／
である。
【００９６】このパケットＡ－７を受信したＡＰ１は、アドレステーブルに基づいて転送先ＡＰ４へパケットＢ－９を送信する。このパケットＢ－９のアドレスフィールドは、
ＡＰ４／ＡＰ１／ＳＴＡ６／ＳＴＡ１／
である。
【００９７】このパケットＢ－９を受信したＡＰ４は、送信元ＳＴＡ１と転送元ＡＰ１とを対応付けてアドレステーブルを更新し、アドレステーブルに基づいて転送先ＡＰ５へパケットＢ－10を送信する。このパケットＢ－10のアドレスフィールドは、
ＡＰ５／ＡＰ４／ＳＴＡ６／ＳＴＡ１／
である。
【００９８】このパケットＢ－10を受信したＡＰ５は、送信元ＳＴＡ１と転送元ＡＰ４とを対応付けてアドレステーブルを更新し、帰属テーブルに基づいてＳＴＡ６へパケットＣ－６を送信する。このパケットＣ－６のアドレスフィールドは、
ＳＴＡ６／ＳＴＡ１／／／
である。以上示したＳＴＡ１からＳＴＡ６へのパケット転送後の各ＡＰのアドレステーブルの状態は図３４と同じである。なお、このときＡＰ５のアドレステーブルにカッコ書きで示したＳＴＡ１とＡＰ４が登録される。
【００９９】図３６は、請求項６の学習型無線パケット転送方法（通信路切替時）における無線端末ＳＴＡと無線基地局ＡＰの動作フローを示す。図３７は、ＡＰ５がＡＰ２からＡＰ４へ通信路を切り替えた場合の処理を示す。なお、各ＡＰのアドレステーブルは図２８(b)、各ＡＰの帰属テーブルおよび中継ＡＰテーブルは図２９(a),(b)の状態とする。以下、図３６のフローチャートに対応させながら具体的に説明する。
【０１００】ＡＰ５が切替元ＡＰ２との通信路を切替先ＡＰ４に切り替え、切替先ＡＰ４に帰属すると（Ｓ60）、図２９(b)に示すＡＰ５の中継ＡＰテーブルに登録されている上位ＡＰ２を上位ＡＰ４に更新し、ＡＰ４の中継ＡＰテーブルに下位ＡＰ５を登録する（図３３参照）。また、図２８(b)に示すＡＰ５のアドレステーブルに登録されているＡＰ２関係を削除する（Ｓ61）。
【０１０１】次に、ＡＰ５は、アドレステーブルに登録中のＳＴＡの中から切替元ＡＰ２以外のＡＰに対応付けられている全ＳＴＡ、帰属テーブルに登録中の全ＳＴＡ、中継ＡＰテーブルに登録中の下位の全ＡＰを抽出する（Ｓ62）。ここでは、ＳＴＡ６およびＡＰ６が抽出される。ＡＰ５は、抽出したＳＴＡ６およびＡＰ６の代理として、切替元ＡＰ２を宛先とし、ＳＴＡ６またはＡＰ６を送信元としたハンドオフパケットB_H－９を順次送信する（Ｓ63）。このハンドオフパケットB_H－９のアドレスフィールドは、
ＡＰ４／ＡＰ５／ＡＰ２／ＳＴＡ６／
ＡＰ４／ＡＰ５／ＡＰ２／ＡＰ６／
である。
【０１０２】このハンドオフパケットB_H－９を受信したＡＰ４は、送信元ＳＴＡ６，ＡＰ６と送信元ＡＰ５とを対応付けてアドレステーブルを更新する（Ｓ64）。次に、アドレステーブルに基づいて宛先ＡＰ２の転送先ＡＰ１へハンドオフパケットB_H－10を送信する。このハンドオフパケットB_H－10のアドレスフィールドは、
ＡＰ１／ＡＰ４／ＡＰ２／ＳＴＡ６／
ＡＰ１／ＡＰ４／ＡＰ２／ＡＰ６／
である。
【０１０３】このハンドオフパケットB_H－10を受信したＡＰ１は、送信元ＳＴＡ６，ＡＰ６と転送元ＡＰ４とを対応付けてアドレステーブルを更新する（Ｓ64）。次に、中継ＡＰテーブルに基づいて下位のＡＰ２へハンドオフパケットB_H－11を送信する。このハンドオフパケットB_H－11のアドレスフィールドは、
ＡＰ２／ＡＰ１／ＡＰ２／ＳＴＡ６／
ＡＰ２／ＡＰ１／ＡＰ２／ＡＰ６／
である。このハンドオフパケットB_H－11を受信したＡＰ２は、送信元ＳＴＡ６，ＡＰ６と転送元ＡＰ１とを対応付けてアドレステーブルを更新する（Ｓ65）。
【０１０４】同様に、ＡＰ５は、切替元ＡＰ２を宛先とし、自局を送信元としたハンドオフパケットを送信する（Ｓ63）。このハンドオフパケットは図３７に示すB_H－９～B_H－11と同様にＡＰ２まで転送され、送信元ＡＰ５と各転送先ＡＰとを対応付けて各ＡＰのアドレステーブルを更新する（Ｓ64，Ｓ65）。
【０１０５】また、ＡＰ２は、ＡＰ１経由で送信元がＡＰ５のハンドオフパケットを受信することにより、ＡＰ５が他のＡＰ配下に移動したものとみなし、中継ＡＰテーブルからＡＰ５を削除する（Ｓ65）。
【０１０６】以上示した各ハンドオフパケット転送後の各ＡＰの中継ＡＰテーブルおよびアドレステーブルの状態は、図３３，３４に示すものと同じである。ＳＴＡ１からＳＴＡ５へ無線パケットを転送する場合も図３５と同様に行われる。
【０１０７】（無線基地局ＡＰの構成例）図３８は、請求項８，１０～１３の無線基地局ＡＰの構成例を示す。図において、無線基地局ＡＰは、無線インタフェース１１、受信パケット判定部１２、制御部１３、帰属テーブル１４、アドレステーブル１５、中継ＡＰテーブル１６、送信パケット生成部１７により構成され、請求項１，３，５，６の学習型無線パケット転送方法に基づく処理を行う。

【０１０８】無線インタフェース１１は、パケットＡ，Ｂを受信して自局宛てのパケットを取り込むとともに、パケットＢ，Ｃを送信する処理を行う（図５のＳ１～Ｓ３、Ｓ９，Ｓ11，Ｓ13）。受信パケット判定部１２は、自局宛ての受信パケットがＳＴＡから送信されたパケットＡか、他のＡＰから送信されたパケットＢか、さらにＳＴＡ移動に伴うハンドオフパケットか、ＡＰ帰属変更に伴うハンドオフ指示パケットおよびハンドオフパケットかを判定し、制御部１３でそれぞれ対応する処理を行わせる（図５のＳ４）。

【０１０９】制御部１３は、受信パケットの種別に応じて、帰属テーブル１４、アドレステーブル１５、中継ＡＰテーブル１６を参照し、必要に応じて各テーブルの登録更新を行い、転送先を決定する（図５のＳ５～Ｓ10，12，14、図１３のＳ32～34、図１３、図１９、図３１、図３６）。送信パケット生成部１７は、転送先に応じたパケットＢまたはパケットＣを生成し、無線インタフェース１１に送出する（図５のＳ９，Ｓ11，Ｓ13）。

【０１１０】図３９は、請求項９の無線基地局ＡＰの構成例を示す。図において、無線基地局ＡＰは、無線インタフェース１１、受信パケット判定部１２、制御部１３、帰属テーブル１４、アドレステーブル１５、中継ＡＰテーブル１６、送信パケット生成部１７、登録保留タイマ１８により構成され、請求項２の学習型無線パケット転送方法に基づく処理を行う。

【０１１１】本ＡＰの特徴は、制御部１３に登録保留タイマ１８を接続し、アドレステーブルに登録されているＳＴＡを送信元アドレスとするパケットの連続未受信時間を計測し、タイムアウトしたときにそのＳＴＡ関係の情報を削除するところにある（図１１）。その他の構成は、図３８のＡＰと同様である。

【０１１２】図４０は、請求項１１の有線対応無線基地局ＡＰの構成例を示す。図において、有線対応無線基地局ＡＰは、無線インタフェース１１、受信パケット判定部２１、制御部２２、帰属テーブル１４、アドレステーブル１５、中継ＡＰテーブル１６、学習テーブル２３、送信パケット生成部２４、有線インタフェース２５により構成され、請求項４の学習型無線パケット転送方法に基づく処理を行う。

【０１１３】受信パケット判定部２１は、有線対応ＳＴＡが無線接続から有線接続、有線接続から無線接続へ切り替えたときに、無線インタフェース１１または有線インタフェース２５に受信されるハンドオフパケットまたは無線接続パケットを検出し、制御部２２で対応する処理を行わせる。制御部２２は、ハンドオフパケットまたは無線接続パケットに応じて、帰属テーブル１４、アドレステーブル１５、中継ＡＰテーブル１６、学習テーブル２３を参照し、必要に応じて各テーブルの登録更新を行い、転送先を決定する（図１９）。送信パケット生成部２４は、転送先に応じたハンドオフパケットまたは無線接続パケットを生成し、無線インタフェース１１または有線インタフェース２５に送出する。無線インタフェース１１または有線インタフェース２５は、それぞれ無線回線または有線ＬＡＮに各パケットフォーマットに応じた送信パケットを生成して送信する。なお、通常の無線パケットの送受信については、図３８に示すＡＰと同様の処理を行う。

【０１１４】

【発明の効果】以上説明したように、請求項１，８の学習型無線パケット転送方法および該方法を用いた無線基地局は、アドレステーブルに対応付けられた無線基地局を転送先として選択し、宛先無線端末までパケットを転送することができる。したがって、通信可能な全ての無線基地局に転送する方法に比べて無駄なパケット転送を防止することができるので、無線基地局の装置規模や消費電力の増加を抑え、かつ無線周波数資源を有効に活用し、スループットの低下を防止することができる。

【０１１５】また、無線基地局のインタフェースが１つの場合でも、無線端末と無線基地局をＭＡＣアドレスにより論理的に対応付けることにより、転送先無線基地局を選択して転送可能であり、無線基地局の装置規模や消費電力を最小限に抑えることができる。

【０１１６】また、探索フレームや全経路探索フレームのブロードキャスト送信を用いず、転送先無線基地局を選択して宛先無線端末までパケット転送が可能であるので、スループットの向上を図ることができる。

【０１１７】請求項２，９の発明は、アドレステーブルに登録されている無線端末を送信元アドレスとするパケットの連続未受信時間を管理し、タイムオーバにより登録を削除することにより、アドレステーブルを常に最新状態に保持し、かつ効率よく利用することができる。

【０１１８】請求項３，１０の発明は、無線端末が他の無線基地局のセルに移動したときに、ハンドオフパケットの転送により、中継経路上の無線基地局のアドレステーブルおよび帰属テーブルを更新することができ、状況変更に伴うパケットの誤転送を防止することができる。

【０１１９】請求項４，１１の発明は、有線対応無線端末が無線接続から有線接続に切り替えたとき、または有線接続から無線接続に切り替えたときに、ハンドオフパケットまたは無線接続パケットの転送により、中継経路上の無線基地局のアドレステーブルおよび帰属テーブルを更新することができ、状況変更に伴うパケットの誤転送を防止することができる。

【０１２０】請求項５，１２の発明は、無線基地局が上位の無線基地局との通信路を切り替えたときに、ハンドオフ指示パケットでその配下の無線端末および無線基地局にハンドオフパケットを送信させることにより、中継経路上の無線基地局のアドレステーブルを更新することができ、状況変更に伴うパケットの誤転送を防止することができる。

【０１２１】請求項６，１３の発明は、無線基地局が上位の無線基地局との通信路を切り替えたときに、その配下の無線端末および無線基地局の代理としてそれぞれを送信元とするハンドオフパケットを送信することにより、中継経路上の無線基地局のアドレステーブルを更新することができ、状況変更に伴うパケットの誤転送を防止することができる。

【０１２２】請求項７の発明は、アドレステーブルで宛先無線基地局と転送先の無線基地局を対応付けることができるので、無線基地局を宛先とするハンドオフパケット等の転送もデータパケットと同様に効率的に行うことができる。

【図面の簡単な説明】

【図１】請求項１，２の学習型無線パケット転送方法が適用される無線パケット網の構成例を示す図。

【図２】図１の無線パケット網におけるＡＰ間のツリー構造を示す図。

【図３】図１の無線パケット網における帰属テーブルおよび中継ＡＰテーブルを示す図。

【図４】本発明で用いるパケットフォーマットの一例を示す図。

【図５】請求項１の学習型無線パケット転送方法における無線基地局ＡＰのパケット受信時の動作フローを示す図。

【図６】ＳＴＡ１からＳＴＡ５へ無線パケットを転送する例を示す図。

【図７】図６に示す無線パケット転送後のアドレステーブルを示す図。

【図８】折り返しＳＴＡ５からＳＴＡ１へ無線パケットを転送する例を示す図。

【図９】図８に示す無線パケット転送後のアドレステーブルを示す図。

【図１０】再度ＳＴＡ１からＳＴＡ５へ無線パケットを転送する例を示す図。

【図１１】請求項２の学習型無線パケット転送方法における無線基地局ＡＰのパケット受信時の動作フローを示す図。

【図１２】請求項３の学習型無線パケット転送方法が適用される無線パケット網および各ＡＰのアドレステーブルを示す図。

【図１３】請求項３の学習型無線パケット転送方法（ハンドオフ時）における無線端末ＳＴＡおよび無線基地局ＡＰの動作フローを示す図。

【図１４】ＳＴＡ５がＡＰ５配下からＡＰ４配下に移動した場合の処理を示す図。

【図１５】図１４に示すハンドオフパケット転送後のアドレステーブルおよび帰属テーブルを示す図。

【図１６】ＳＴＡ１からＳＴＡ５へ無線パケットを転送する例を示す図。

【図１７】請求項４の学習型無線パケット転送方法が適用される無線パケット網の構成例を示す図。

【図１８】ラーニングブリッジおよびＡＰ１の学習テーブルを示す図。

【図１９】請求項４の学習型無線パケット転送方法における無線端末ＳＴＡと無線基地局ＡＰの動作フローを示す図。

【図２０】ＳＴＡ５が有線接続へ切り替えた場合の処理を示す図。

【図２１】図２０に示すハンドオフパケット転送後の学習テーブルを示す図。

【図２２】図２０に示すハンドオフパケット転送後のアドレステーブルおよび帰属テーブルを示す図。

【図２３】ＳＴＡ１からＳＴＡ５へ無線パケットを転送する例を示す図。

【図２４】ＳＴＡ５が有線接続からＡＰ３配下に移動した場合の処理を示す図。

【図２５】図２４に示す無線接続パケット転送後の学習テーブルを示す図。

【図２６】図２４に示す無線接続パケット転送後のアドレステーブルおよび帰属テーブルを示す図。

【図２７】ＳＴＡ１からＳＴＡ５へ無線パケットを転送する例を示す図。

【図２８】請求項５，６の学習型無線パケット転送方法が適用される無線パケット網および各ＡＰのアドレステーブルを示す図。

【図２９】図２８の無線パケット網における帰属テーブルおよび中継ＡＰテーブルを示す図。

【図３０】切り替え前後のＡＰ間のツリー構造を示す図。

【図３１】請求項５の学習型無線パケット転送方法（通信路切替時）における無線端末ＳＴＡと無線基地局ＡＰの動作フローを示す図。

【図３２】ＡＰ５がＡＰ２からＡＰ４へ通信路を切り替えた場合の処理を示す図。

【図３３】図３２に示すハンドオフパケット転送後の中継ＡＰテーブルを示す図。

【図３４】図３２に示すハンドオフパケット転送後のアドレステーブルを示す図。

【図３５】ＳＴＡ１からＳＴＡ６へ無線パケットを転送する例を示す図。

【図３６】請求項６の学習型無線パケット転送方法（通信路切替時）における無線端末ＳＴＡと無線基地局ＡＰの動作フローを示す図。

【図３７】ＡＰ５がＡＰ２からＡＰ４へ通信路を切り替えた場合の処理を示す図。

【図３８】請求項８，１０～１３の無線基地局ＡＰの構成例を示すブロック図。

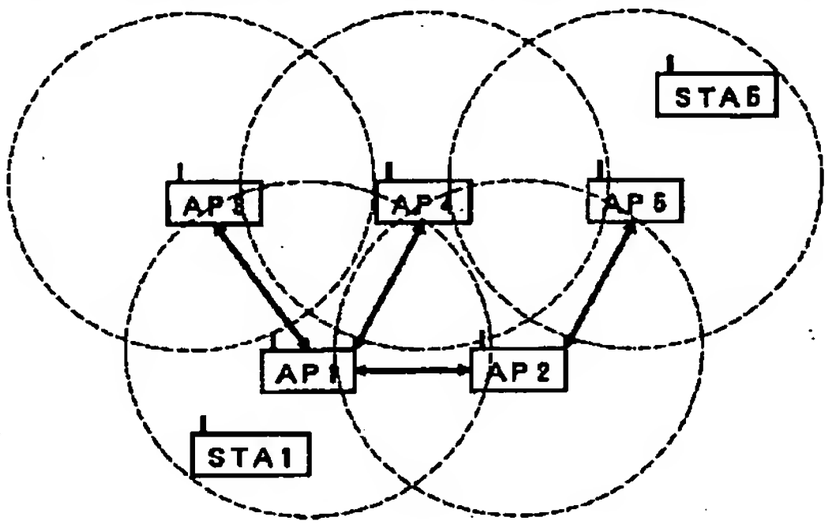
【図３９】請求項９の無線基地局ＡＰの構成例を示すブロック図。

【図４０】請求項１１の有線対応無線基地局ＡＰの構成

例を示すブロック図。
【図４１】ラーニングブリッジを用いたネットワーク例を示す図。
【図４２】ソースルーティングブリッジを用いたネットワーク例を示す図。
【符号の説明】
ＡＰ　　無線基地局
ＳＴＡ　無線端末
１１　無線インタフェース
１２，２１　受信パケット判別部
１３，２２　制御部
１４　帰属テーブル
１５　アドレステーブル
１６　中継ＡＰテーブル
１７，２４　送信パケット生成部
１８　登録保留タイマ
２３　学習テーブル
２５　有線インタフェース

【図１】

請求項１，２の学習型無線パケット転送方法が適用される無線パケット網



【図３】

図１の無線パケット網における帰属テーブルおよび中継ＡＰテーブル

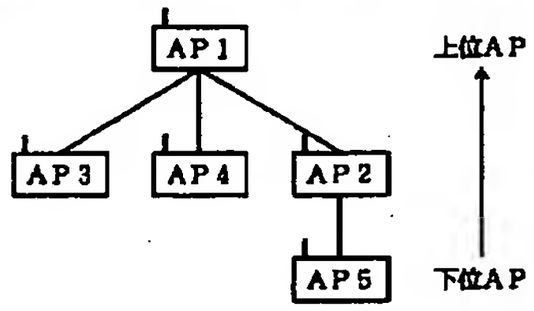
(a) 帰属テーブル

AP1	AP2	AP3	AP4	AP5
STA アドレス	STA アドレス	STA アドレス	STA アドレス	STA アドレス
STA1				STA5

(b) 中継ＡＰテーブル

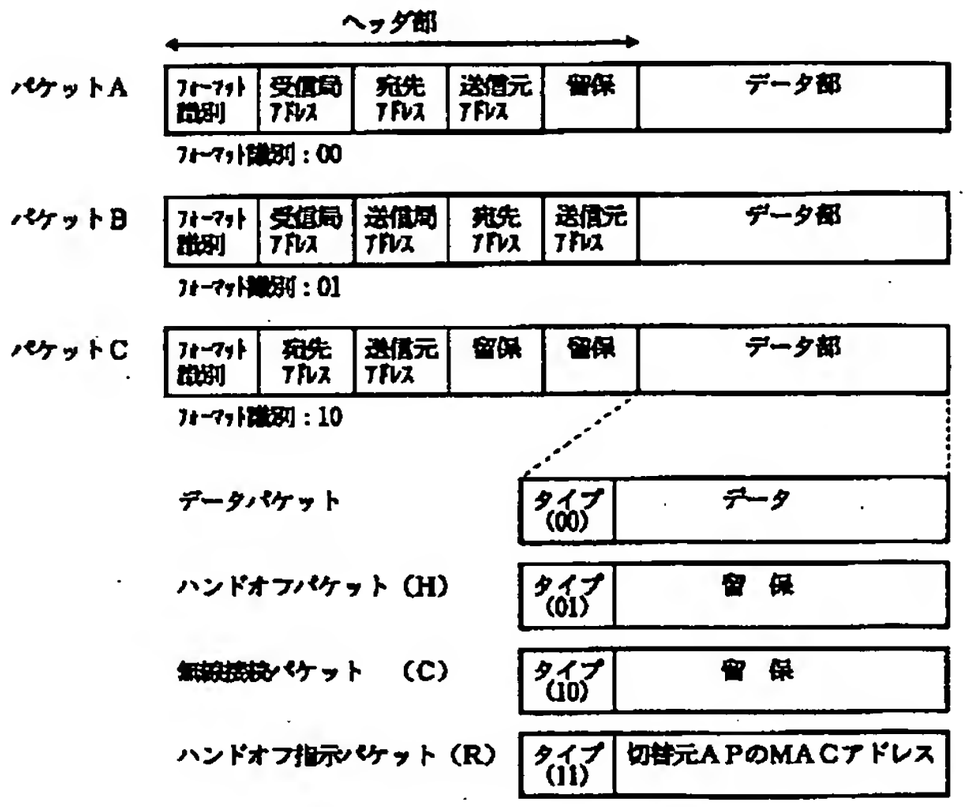
AP1（ルート）	AP2	AP3	AP4	AP5
APアドレス	APアドレス	APアドレス	APアドレス	APアドレス
AP2	AP1（上位	AP1（上位	AP1（上位	AP2（上位
AP3	AP5			
AP4				

図１の無線パケット網におけるＡＰ間のツリー構造



【図４】

本発明で用いるパケットフォーマットの一例



【図１８】

ラーニングブリッジおよびＡＰ１の学習テーブル

ラーニングブリッジ

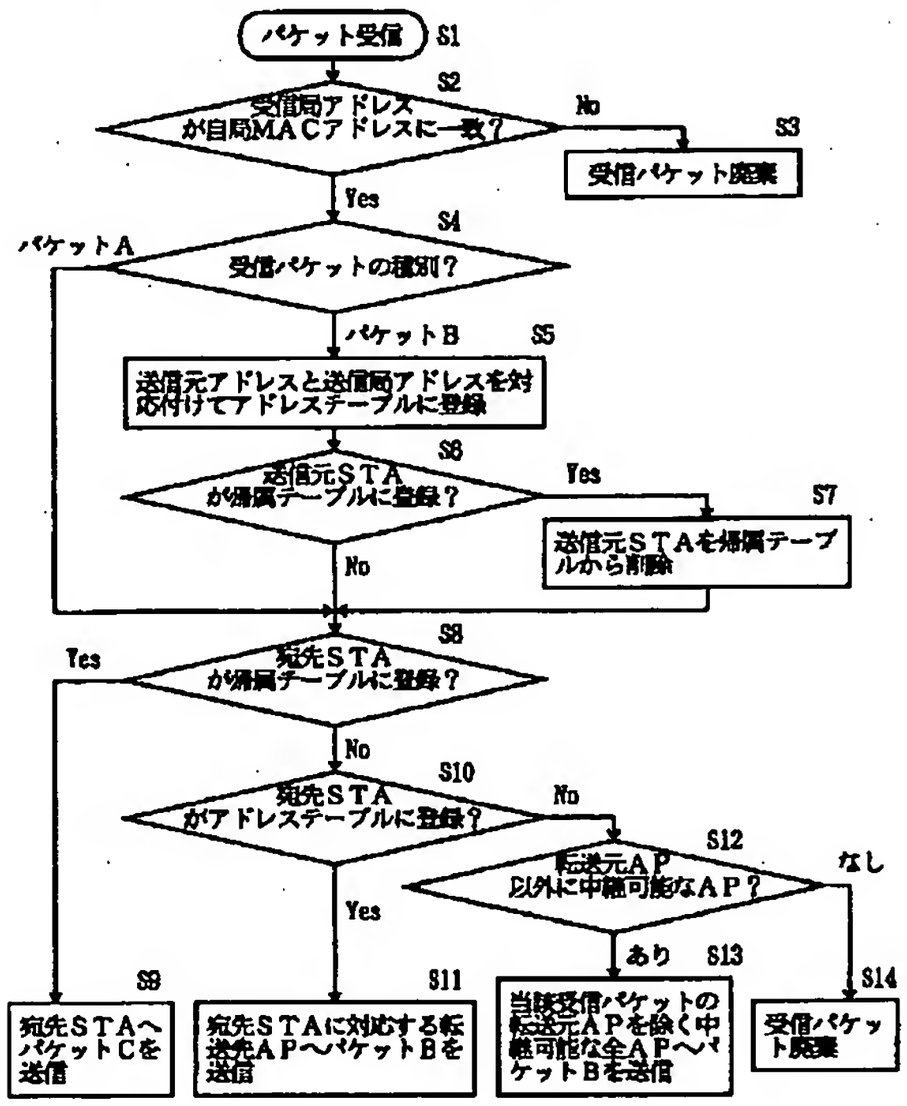
STA／AP	インタフェース番号
STA1	#2
STA5	#2
AP1	#2
AP2	#2
AP3	#2
AP4	#2
AP5	#2

AP1

STA／AP	インタフェース種別
STA1	無線インタフェース
STA5	無線インタフェース
AP2	無線インタフェース
AP3	無線インタフェース
AP4	無線インタフェース
AP5	無線インタフェース

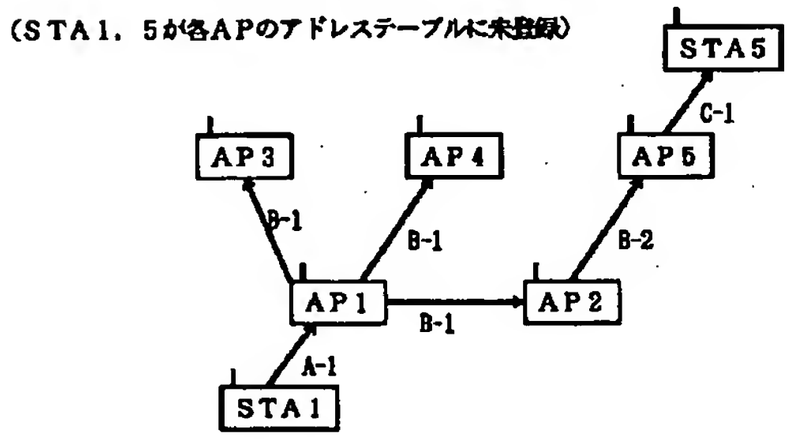
【図５】

請求項１の学習型無線パケット転送方法における無線基地局ＡＰのパケット受信時の動作フロー



【図６】

ＳＴＡ１からＳＴＡ５へ無線パケットを転送する例



【図７】

図６に示す無線パケット転送後のアドレステーブル

AP1

宛先	転送先

AP2

宛先	転送先
STA5	AP2

AP3

宛先	転送先
STA5	AP1

AP4

宛先	転送先
STA5	AP1

AP5

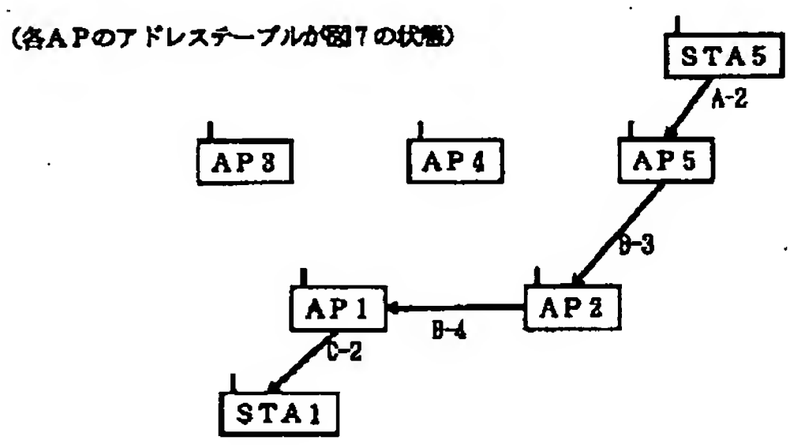
宛先	転送先
STA5	AP2

登録／更新　送信元アドレス：送信局アドレス（送信元ＳＴＡ：転送元ＡＰ）

転送先参照　宛先アドレス：受信局アドレス（宛先ＳＴＡ：転送先ＡＰ）

【図８】

折り返しＳＴＡ５からＳＴＡ１へ無線パケットを転送する例



【図９】

図８に示す無線パケット転送後のアドレステーブル

AP1

宛先	転送先
STA5	AP2

AP2

宛先	転送先
STA1	AP1
STA5	AP2

AP3

宛先	転送先
STA1	AP1

AP4

宛先	転送先
STA1	AP1

AP5

宛先	転送先
STA1	AP2

【図２１】

図20に示すハンドオフパケット転送後の学習テーブル

ラーニングブリッジ

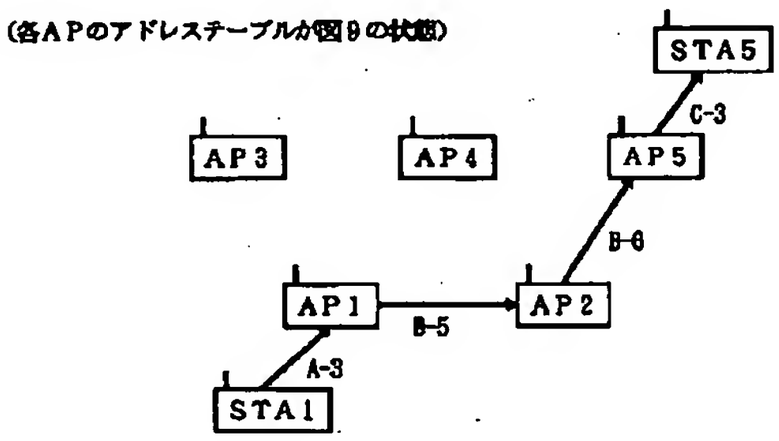
STA／AP	インタフェース番号
STA1	#2
STA5	#1
AP1	#2
AP2	#2
AP3	#2
AP4	#2
AP5	#2

AP1

STA／AP	インタフェース種別
STA1	無線インタフェース
STA5	有線インタフェース
AP2	無線インタフェース
AP3	無線インタフェース
AP4	無線インタフェース
AP5	無線インタフェース

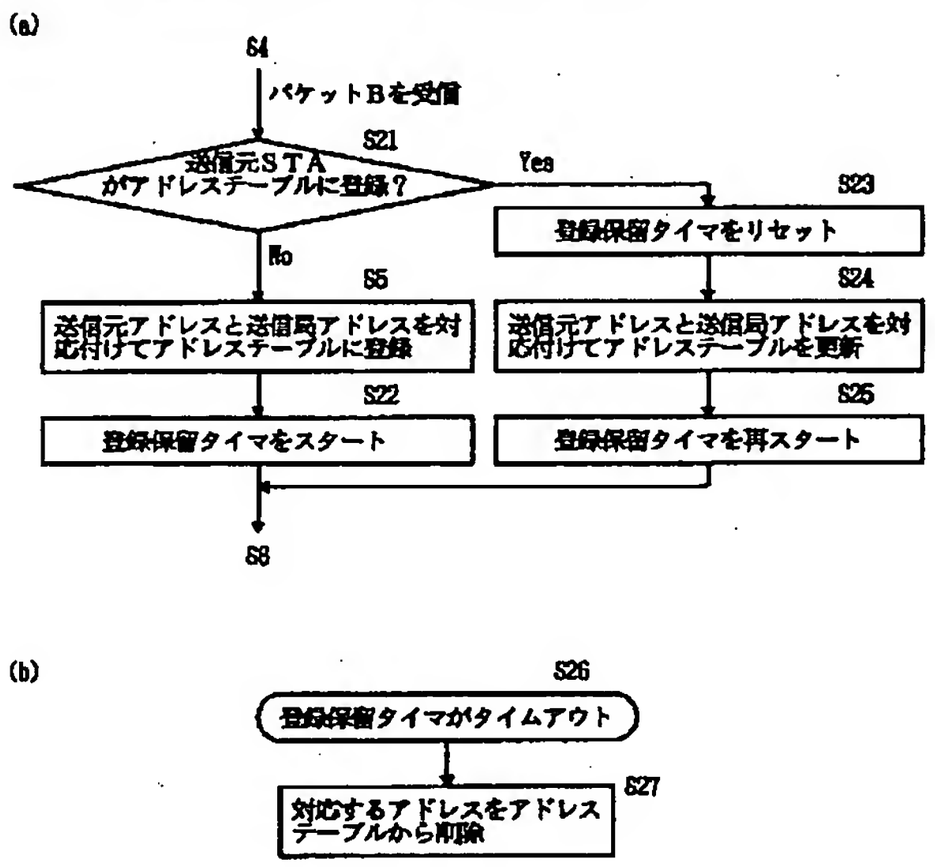
【図１０】

再度ＳＴＡ１からＳＴＡ５へ無線パケットを転送する例



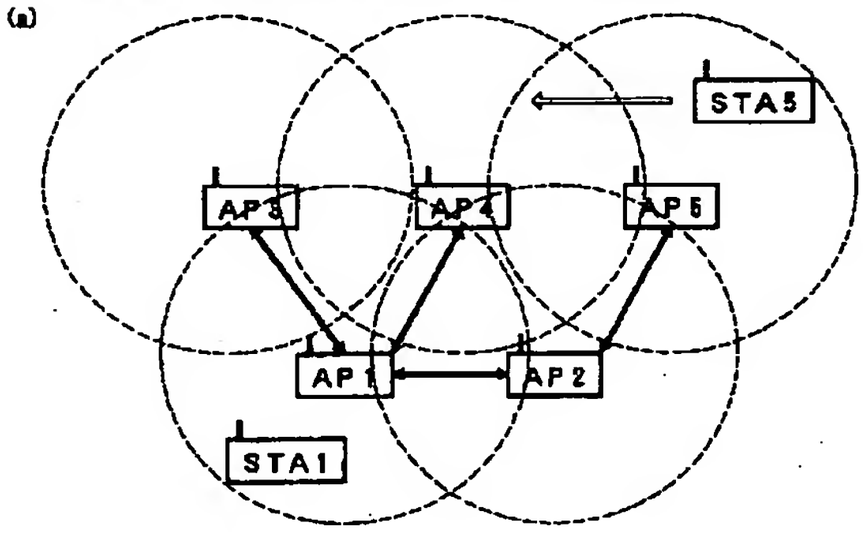
【図１１】

請求項２の学習型無線パケット転送方法における
無線基地局ＡＰのパケット受信時の動作フロー



【図１２】

請求項３の学習型無線パケット転送方法が適用される
無線パケット網および各ＡＰのアドレステーブル



(b) アドレステーブル

AP1

宛先	転送先
STA5	AP2
AP5	AP2

AP2

宛先	転送先
STA1	AP1
STA5	AP5
AP4	AP1
AP3	AP1

AP3

宛先	転送先
STA1	AP1
STA5	AP1
AP2	AP1
AP4	AP1
AP5	AP1

AP4

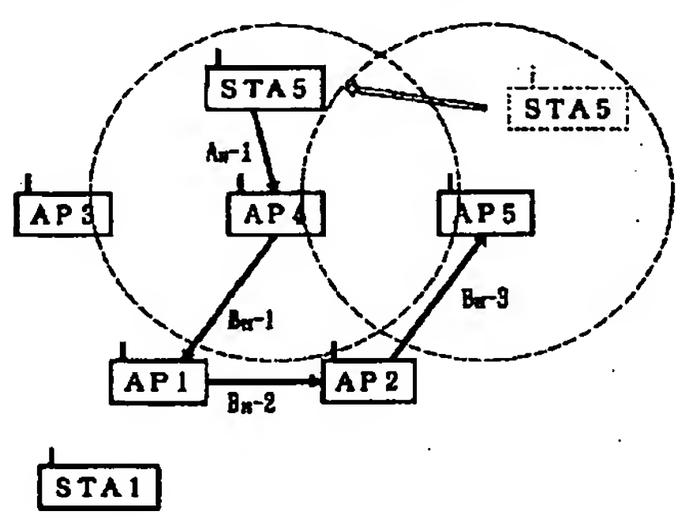
宛先	転送先
STA1	AP1
STA5	AP1
AP2	AP1
AP3	AP1
AP5	AP1

AP5

宛先	転送先
STA1	AP2
AP1	AP2
AP3	AP2
AP4	AP2

【図１４】

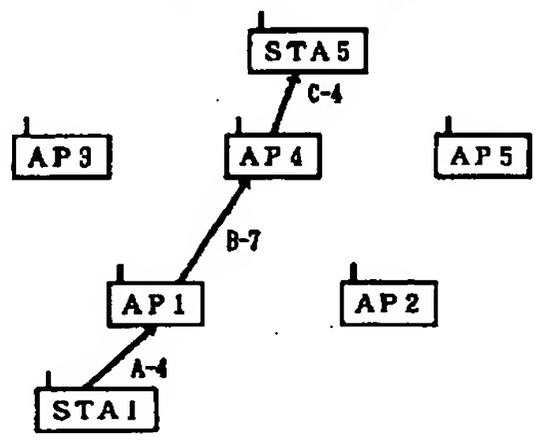
ＳＴＡ５がＡＰ５配下からＡＰ４配下に移動した場合の処理



【図１６】

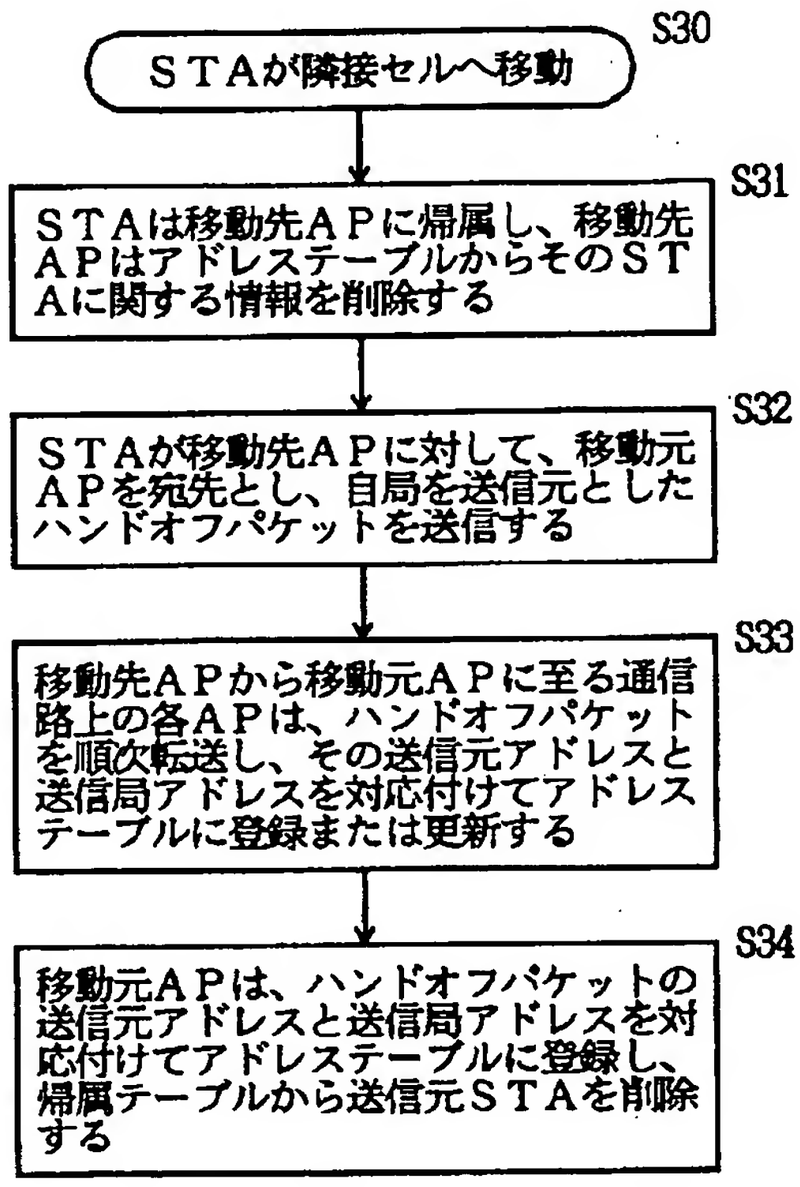
ＳＴＡ１からＳＴＡ５へ無線パケットを転送する例

(各ＡＰのアドレステーブル、借置テーブルが図15の状態)



【図１３】

請求項３の学習型無線パケット転送方法（ハンドオフ時）における無線端末ＳＴＡおよび無線基地局ＡＰの動作フロー



【図２５】

図24に示す無線接続パケット転送後の学習テーブル

ラーニングブリッジ

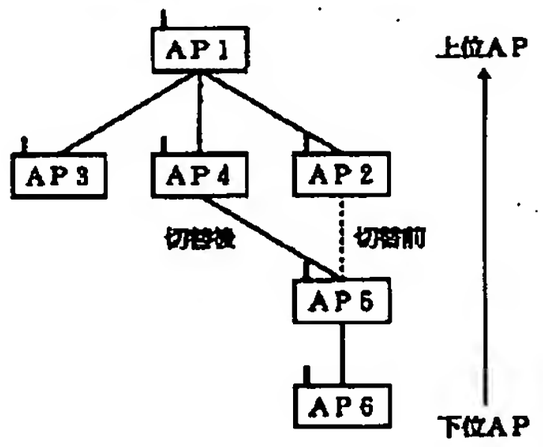
STA／AP	インタフェース 番号
STA1	＃2
STA5	＃2
AP1	＃2
AP2	＃2
AP3	＃2
AP4	＃2
AP5	＃2

AP1

STA／AP	インタフェース 種別
STA1	無線インタフェース
STA5	無線インタフェース
AP2	無線インタフェース
AP3	無線インタフェース
AP4	無線インタフェース
AP5	無線インタフェース

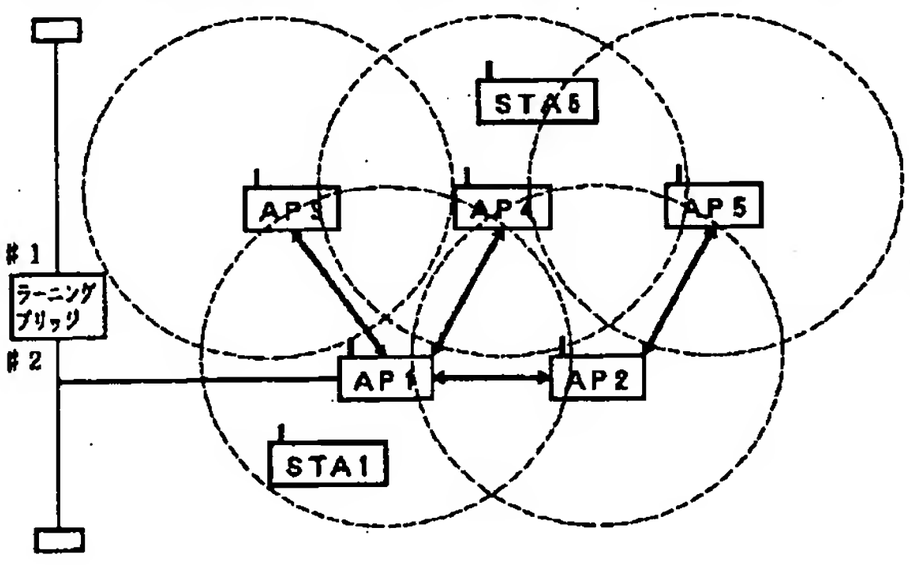
【図３０】

切り替え前後のＡＰ間のツリー構造



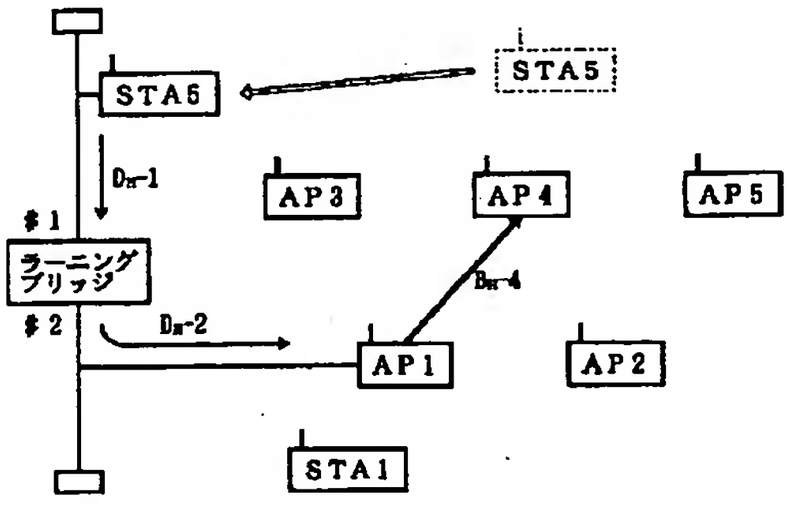
【図１７】

請求項４の学習型無線パケット転送方法が適用される無線パケット網



【図２０】

ＳＴＡ５が有線接続へ切り替えた場合の処理



【図１５】

図14に示すハンドオフパケット転送後のアドレステーブルおよび帰属テーブル

(a) アドレステーブル

AP1

宛先	転送先
STA5	AP4
AP5	AP2

AP2

宛先	転送先
STA1	AP1
STA5	AP1
AP4	AP1
AP3	AP1

AP3

宛先	転送先
STA1	AP1
STA5	AP1
AP2	AP1
AP4	AP1
AP5	AP1

AP4

宛先	転送先
STA1	AP1
AP2	AP1
AP3	AP1
AP5	AP1

AP5

宛先	転送先
STA1	AP2
AP1	AP2
AP3	AP2
AP4	AP2
STA5	AP2

(b) 帰属テーブル

AP1	AP2	AP3	AP4	AP5
STA アドレス	STA アドレス	STA アドレス	STA アドレス	STA アドレス
STA1			STA5	

【図２２】

図20に示すハンドオフパケット転送後のアドレステーブルおよび帰属テーブル

(a) アドレステーブル

AP1

宛先	転送先
AP5	AP2

AP2

宛先	転送先
STA1	AP1
STA5	AP1
AP4	AP1
AP3	AP1

AP3

宛先	転送先
STA1	AP1
STA5	AP1
AP2	AP1
AP4	AP1
AP5	AP1

AP4

宛先	転送先
STA1	AP1
STA5	AP1
AP2	AP1
AP3	AP1
AP5	AP1

AP5

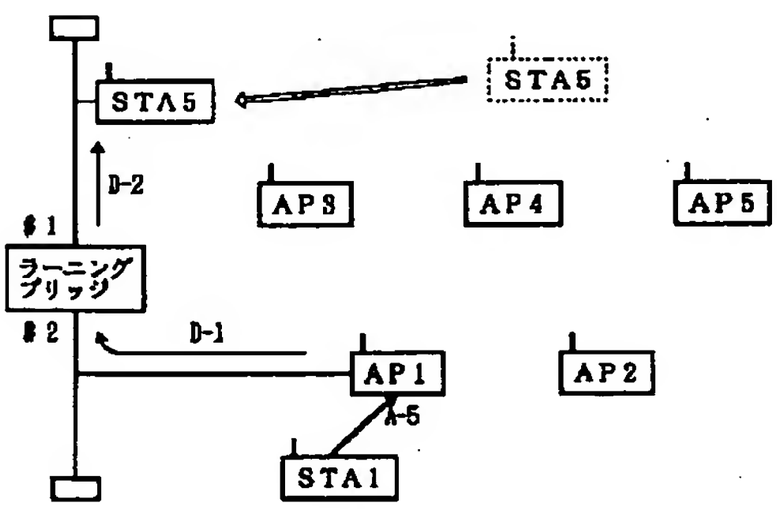
宛先	転送先
STA1	AP2
AP1	AP2
AP3	AP2
AP4	AP2
STA5	AP2

(b) 帰属テーブル

AP1	AP2	AP3	AP4	AP5
STA アドレス	STA アドレス	STA アドレス	STA アドレス	STA アドレス
STA1				

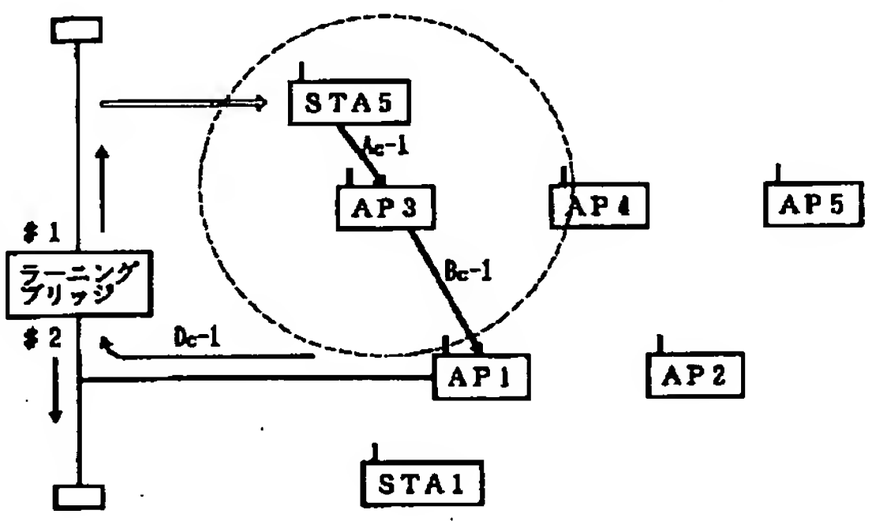
【図２３】

STA1からSTA5へ無線パケットを転送する例



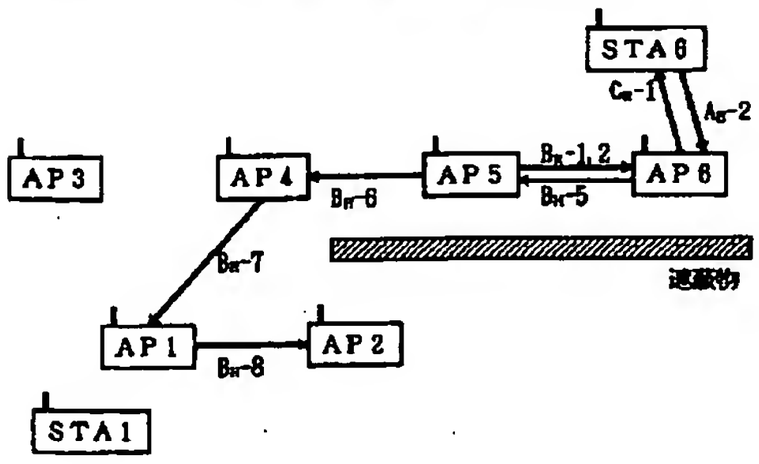
【図２４】

STA5が有線接続からAP3配下に移動した場合の処理



【図３２】

AP5がAP2からAP4へ通信路を切り替えた場合の処理



【図３３】

図32に示すハンドオフパケット転送後の中継APテーブル

AP1（ルート）

APアドレス
AP2
AP3
AP4

AP2

APアドレス
AP1（上位）

AP3

APアドレス
AP1（上位）

AP4

APアドレス
AP1（上位）
AP5（下位）

AP5

APアドレス
AP4（上位）
AP6

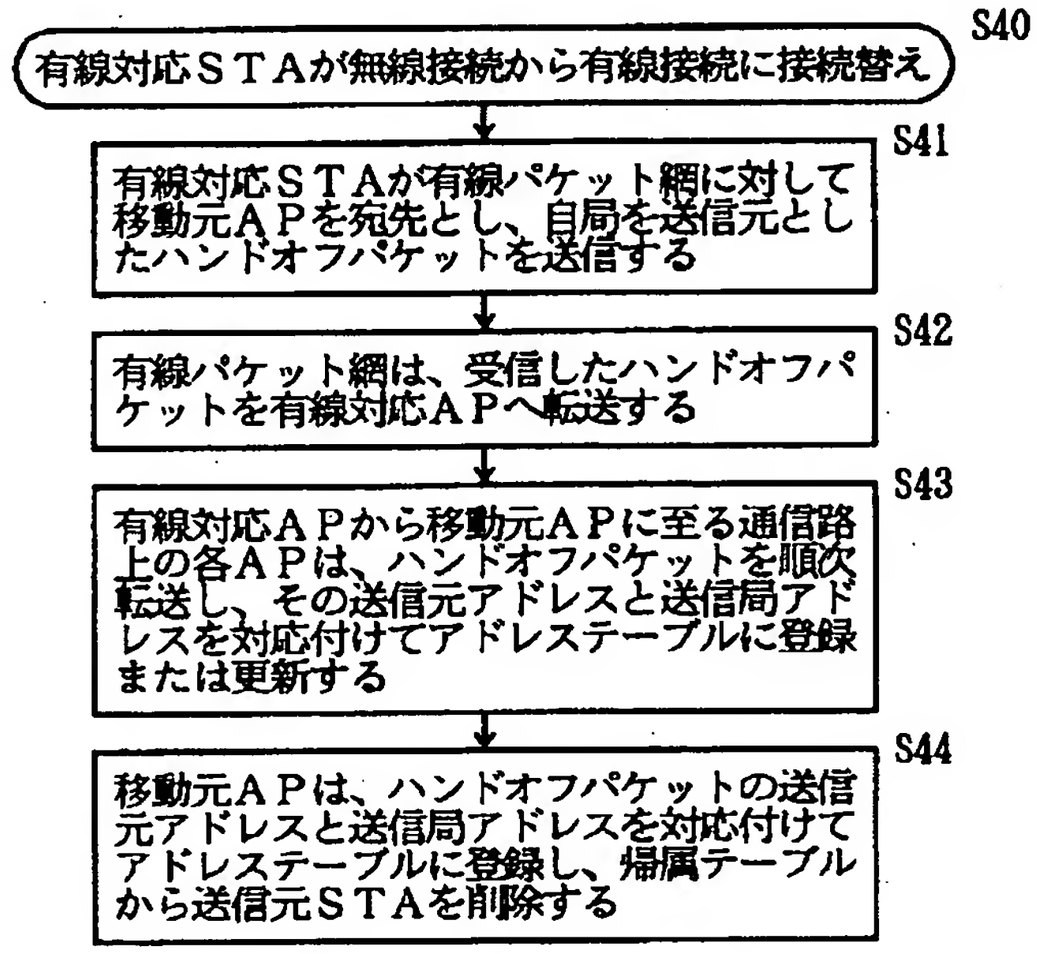
AP6

APアドレス
AP5（上位）

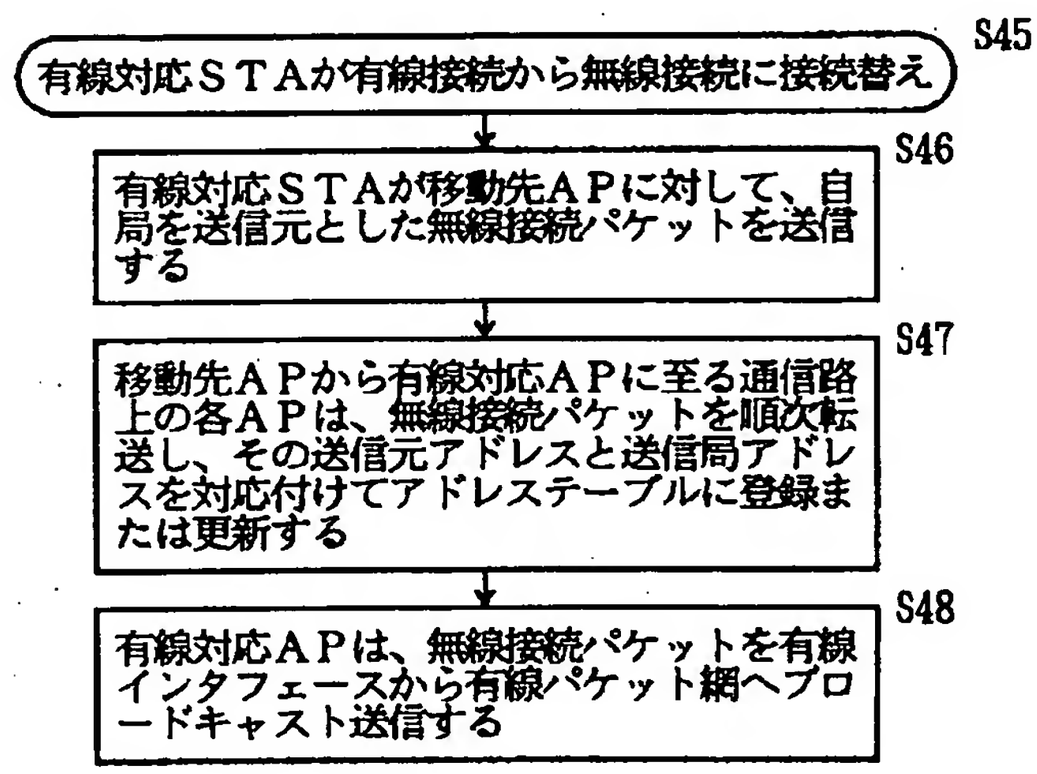
【図１９】

請求項４の学習型無線パケット転送方法における
無線端末ＳＴＡおよび無線基地局ＡＰの動作フロー

(a)



(b)



【図２６】

図24に示す無線接続パケット転送後のアドレステーブルおよび帰属テーブル

(a) アドレステーブル

AP1

宛先	転送先
STA5	AP5
AP5	AP2

AP2

宛先	転送先
STA1	AP1
STA5	AP1
AP4	AP1
AP3	AP1

AP3

宛先	転送先
STA1	AP1
AP2	AP1
AP4	AP1
AP5	AP1

AP4

宛先	転送先
STA1	AP1
STA5	AP1
AP2	AP1
AP3	AP1
AP5	AP1

AP5

宛先	転送先
STA1	AP2
AP1	AP2
AP3	AP2
AP4	AP2
STA5	AP2

(b) 帰属テーブル

AP1

STA アドレス
STA1

AP2

STA アドレス

AP3

STA アドレス
STA5

AP4

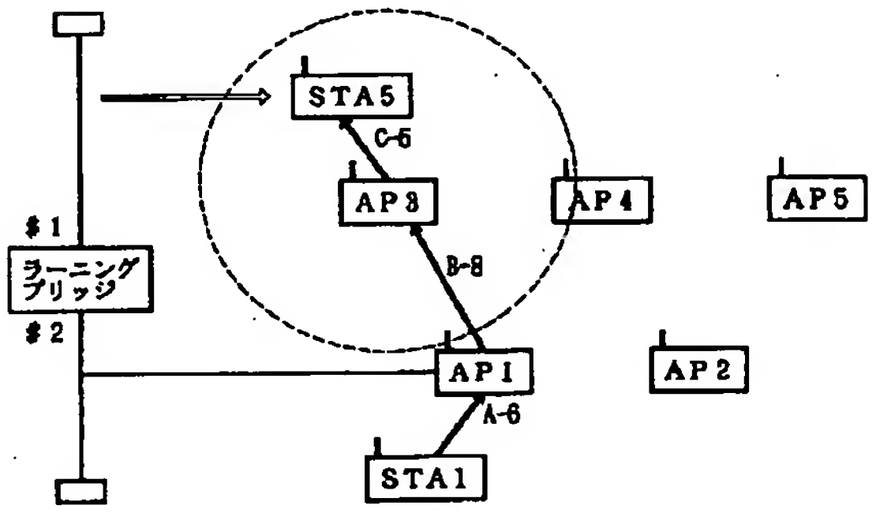
STA アドレス

AP5

STA アドレス

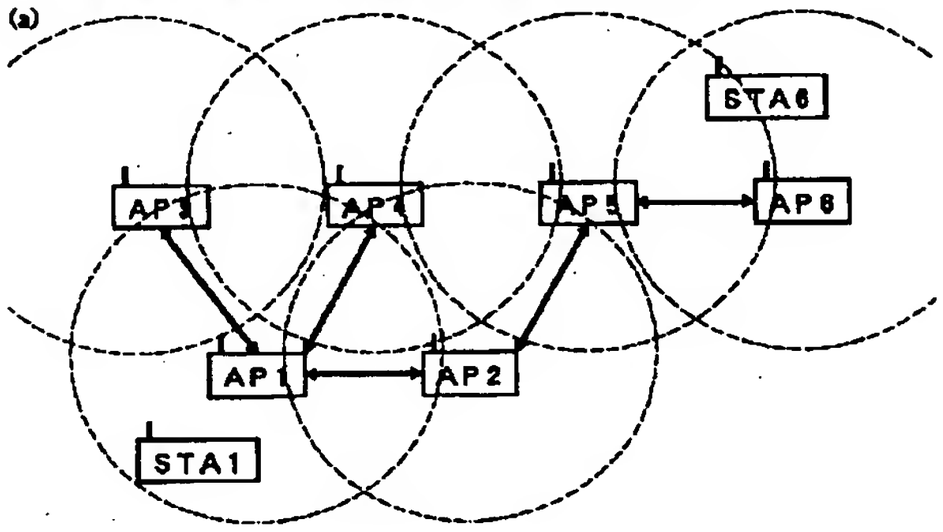
【図２７】

STA1からSTA5へ無線パケットを転送する例



【図２８】

請求項５，６の学習型無線パケット転送方法が適用される無線パケット網および各ＡＰのアドレステーブル



(b) アドレステーブル

AP1

宛先	転送先
STA6	AP2
AP5	AP2
AP6	AP2

AP2

宛先	転送先
STA1	AP1
STA6	AP5
AP4	AP1
AP3	AP1
AP6	AP5

AP3

宛先	転送先
STA1	AP1
STA6	AP1
AP2	AP1
AP4	AP1
AP5	AP1
AP6	AP1

AP4

宛先	転送先
STA1	AP1
STA6	AP1
AP2	AP1
AP3	AP1
AP5	AP1
AP6	AP1

AP5

宛先	転送先
STA1	AP2
STA6	AP6
AP1	AP2
AP3	AP2
AP4	AP2

AP6

宛先	転送先
STA1	AP5
AP1	AP5
AP2	AP5
AP3	AP5
AP4	AP5

【図２９】

図28の無線パケット網における帰属テーブルおよび中継ＡＰテーブル

(a) 帰属テーブル

AP1

STA アドレス
STA1

AP2

STA アドレス

AP3

STA アドレス

AP4

STA アドレス

AP5

STA アドレス

AP6

STA アドレス
STA6

(b) 中継APテーブル

AP1 (ルート)

APアドレス
AP2
AP3
AP4

AP2

APアドレス
AP1 (上位)
AP5

AP3

APアドレス
AP1 (上位)

AP4

APアドレス
AP1 (上位)

AP5

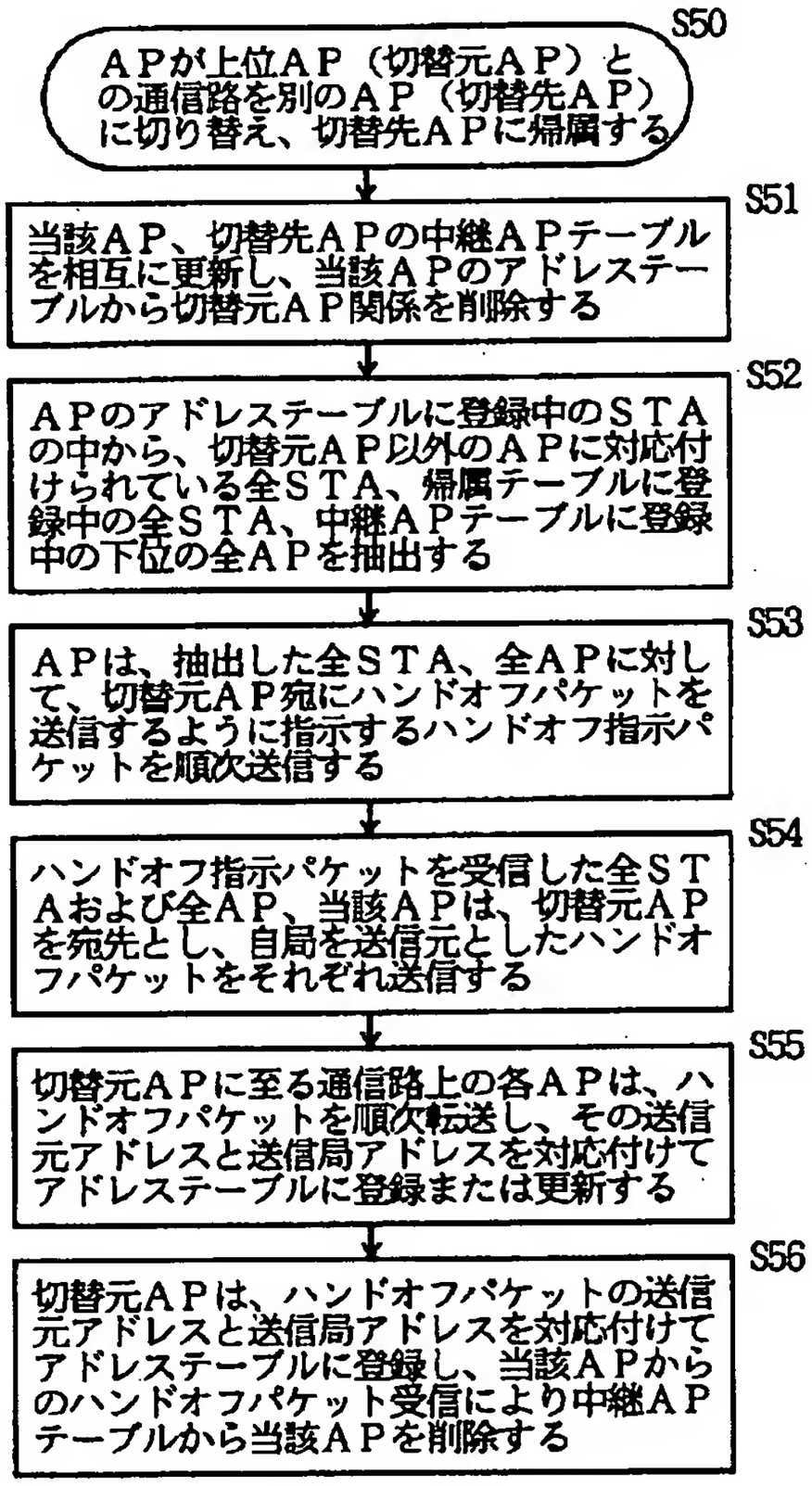
APアドレス
AP2 (上位)
AP6

AP6

APアドレス
AP5 (上位)

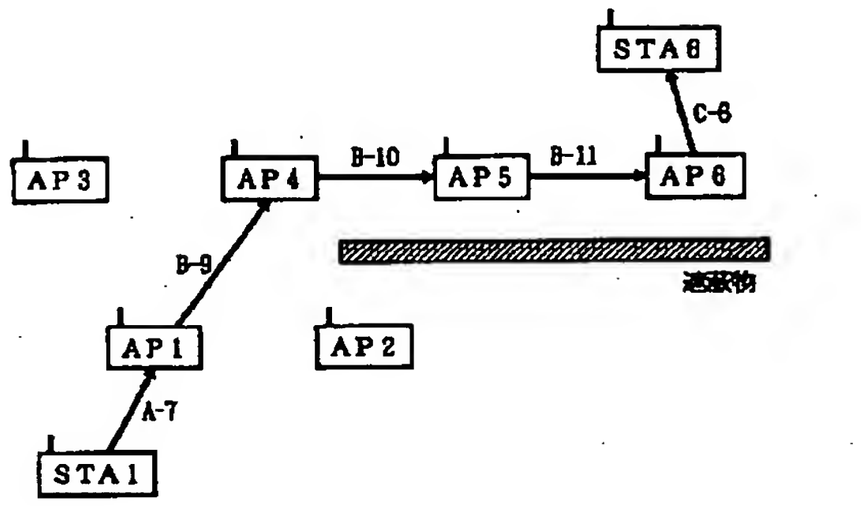
【図３１】

請求項５の学習型無線パケット転送方法（通信路切替時）における無線端末ＳＴＡおよび無線基地局ＡＰの動作フロー



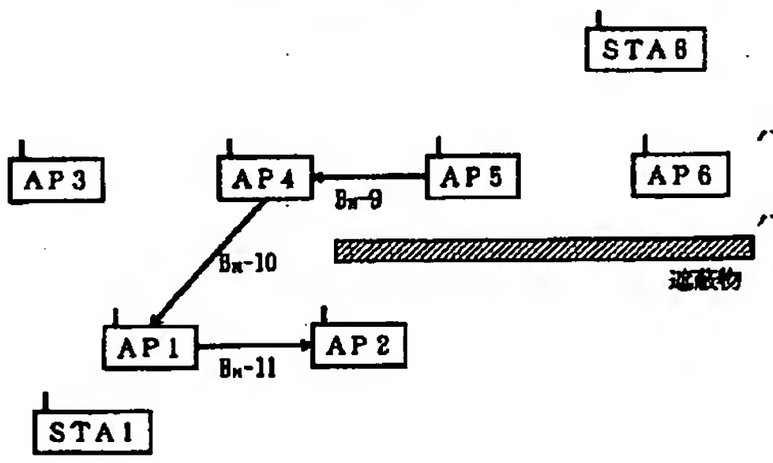
【図３５】

ＳＴＡ１からＳＴＡ６へ無線パケットを転送する例



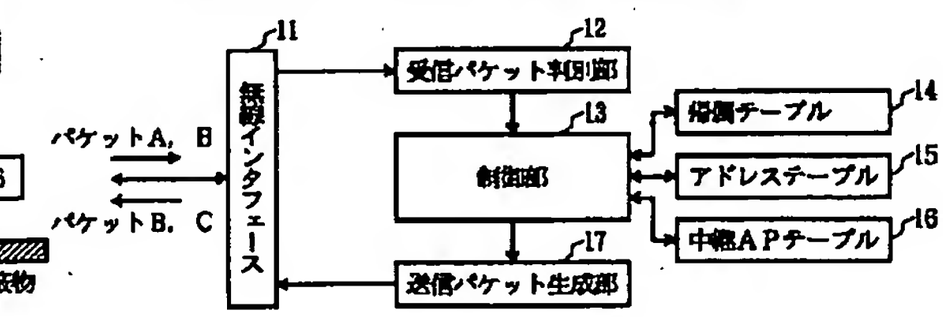
【図３７】

ＡＰ５がＡＰ２からＡＰ４へ通信路を切り替えた場合の処理



【図３８】

請求項８，10～13の無線基地局ＡＰの構成例



【図３４】

図32に示すハンドオフパケット転送後のアドレステーブル

AP1

宛先	転送先
STA6	AP2
AP6	AP2
AP5	AP3

AP2

宛先	転送先
STA1	AP1
STA6	AP1
AP4	AP1
AP3	AP1
AP5	AP1
AP6	AP1

AP3

宛先	転送先
STA1	AP1
STA6	AP1
AP2	AP1
AP4	AP1
AP5	AP1
AP6	AP1

AP4

宛先	転送先
STA1	AP1
STA6	AP5
AP2	AP1
AP3	AP1
AP5	AP5
AP6	AP5

AP5

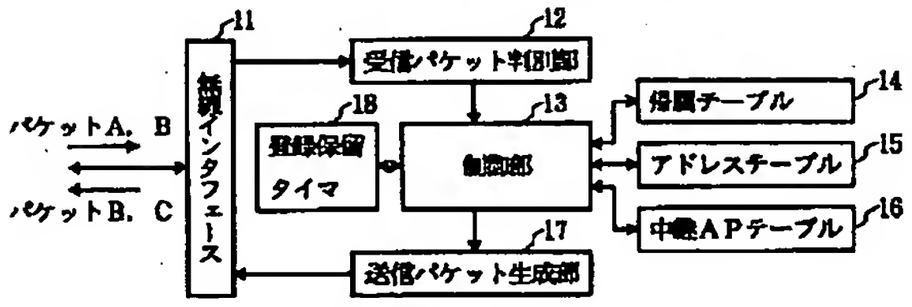
宛先	転送先
STA6	AP6
AP1	AP6
AP2	AP6
AP3	AP6
STA1	AP6

AP6

宛先	転送先
STA1	AP5
AP1	AP5
AP2	AP5
AP3	AP5
AP4	AP5

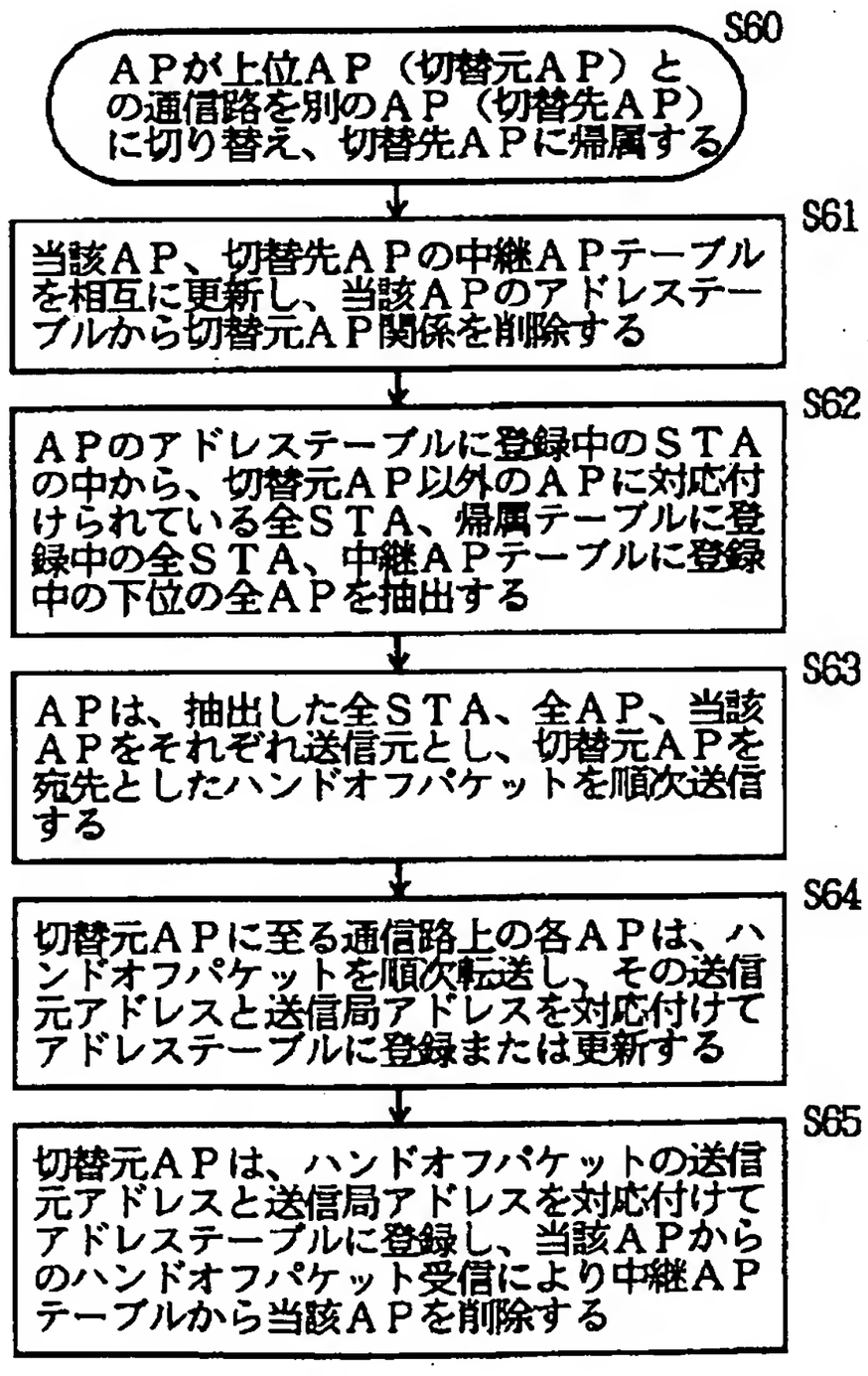
【図３９】

請求項９の無線基地局ＡＰの構成例



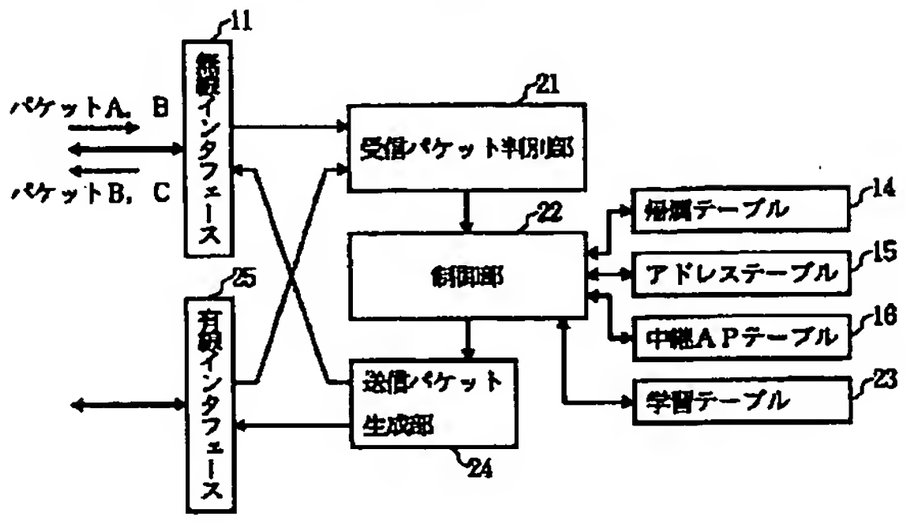
【図３６】

請求項６の学習型無線パケット転送方法（通信路切替時）における無線基地局ＡＰの動作フロー



【図４０】

請求項11の有線対応無線基地局ＡＰの構成例

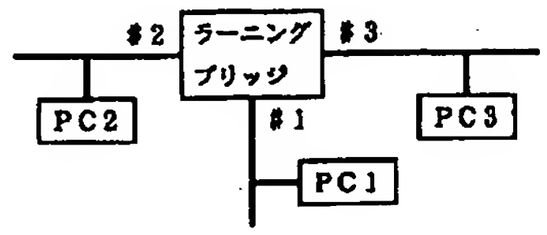


【図４１】

ラーニングブリッジを用いたネットワーク例

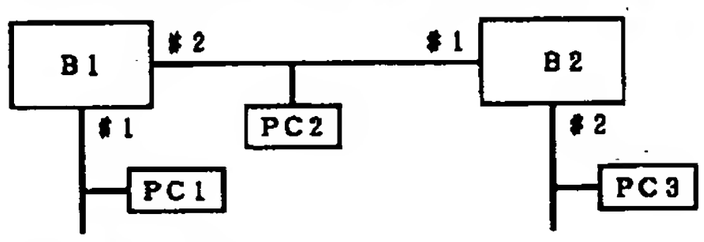
ラーニングブリッジの学習テーブル

MACアドレス	インタフェース番号
ＰＣ１	＃１
ＰＣ２	＃２
ＰＣ３	＃３



【図４２】

(a) ソースルーティングブリッジを用いたネットワーク例



(b) ＰＣ１の経路情報テーブル

MACアドレス	経路情報
ＰＣ３	Ｂ１，＃２，Ｂ２，＃２
ＰＣ２	Ｂ１，＃２

(c) ＰＣ１からＰＣ３へのパケット

ＰＣ１	ＰＣ２	Ｂ１	＃２	Ｂ２	＃２	データ部

宛先　送信元　経路情報

フロントページの続き

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